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Kansas City District

Soil Systems, Inc.

Harry S. Truman Dam & Reservoir
Missouri

(2)

National Register Testing at 23BE1007, 23BE1008, and 23BE1010, Downstream from the Harry S. Truman Dam and Reservoir, Benton County, Missouri

Contract No. DACW41-82-M-0057

By:
William B. Lees
Principal Investigator

Rolfe D. Mandel
Katie A. Parker

1988

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AT 23BE1007, 23BE1008, AND 23BE1010
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DAM AND RESERVOIR
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Submitted to

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By

Soil Systems, Inc.
5330 S.W. 17th St.
Topeka, KS. 66604
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Three prehistoric sites are located in the flood plain of the Osage River downstream from the Harry S. Truman Dam and Reservoir. These three sites are located in areas impacted by proposed Corps of Engineers construction projects. In 1982, test excavations were conducted to determine their National Register eligibility. Results of these investigations found that two were non-eligible and one was determined to be eligible for inclusion on the National Register.

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ABSTRACT

Prehistoric sites 23BE1007, 23BE1008, and 23BE1010 are located in the flood plain of the Osage River (Lake of the Ozarks) downstream from the Harry S. Truman Dam and Reservoir, Benton County, Missouri. Determined in 1981 to be potentially eligible for inclusion on the National Register of Historic Places, these three sites are located in areas impacted by proposed Corps of Engineers construction projects. In 1982, test excavations were conducted at these prehistoric cultural resources in order to gather information sufficient to determine their National Register eligibility. Testing of 23BE1007, 23BE1008, and 23BE1010 utilized a combination of backhoe trenching and controlled excavation methodologies. Results of these investigations identified 23BE1007 as a non-eligible resource due to disturbances, lack of cultural-historical control, and information redundancy. Site 23BE1008 was also determined to be non-eligible, but for reasons that the site lacked any original, prehistoric context. Site 23BE1010, a buried, stratified Woodland habitation site, was determined to be eligible for inclusion on the National Register due to its quality of non-redundant information, and ability to provide answers to current and future questions concerning our prehistoric past. As a result of these determinations, recommendations have been prepared to provide for the mitigation of any adverse impact of the proposed Corps of Engineers projects on site 23BE1010.

INTRODUCTION

During a 1981 survey, archeologists from Southwestern Missouri State University (SMSU) identified four prehistoric archeological sites downstream from the Harry S. Truman Dam and Reservoir, Benton County, Missouri (Purrington 1981). These four sites -- the Gaylord Pasture Site (23BE1007), the Kowertz Site (23BE1008), the Barry Site (23BE1009), and the Lotterer Site (23BE1010) -- were located in areas to be affected by water oriented construction projects proposed by the Kansas City District of the U.S. Army Corps of Engineers. The identification of these four cultural resources was the first step taken by the Corps of Engineers to insure that no cultural resources of national, regional or local significance would be lost as a result of their proposed public works project.

A significant cultural resource is one which has those qualities which make it eligible for listing on the National Register of Historic Places. For prehistoric cultural resources, this quality is found in those sites "that have yielded, or may be likely to yield, information important in prehistory or history" (36CFR60.6). More specifically, significant prehistoric cultural resources are those that are well preserved, and that are distinctive temporally, functionally, typologically or cultural-environmentally. In other words, they are sites which have a quality of non-redundant data which signals their importance for the resolution of current or future research questions about the cultural heritage of the United States (Federal Register 1977:47667-47669; Glassow 1977).

The determination of what National Register cultural resources may be affected by a proposed government undertaking, and the preservation of any such significant cultural resources has been provided for by a series of laws passed in the last two decades. Specifically, the work resulting in this report has been required under the provisions of the National Historic Preservation Act of 1966 (PL 89-665) and Executive Order 11593, "Protection and Enhancement of the Cultural Environment", dated 13 May 1971, Section 2(a). Funding for this project has been authorized under Public Law 86-523 as amended by the Archeological and Historic Preservation Act (PL 93-291).

Once a cultural resource has been identified, its National Register significance must be determined. Only those resources which can be demonstrated to be of National Register quality will warrant preservation by the government. This project has been directed at the collection of sufficient information on sites 23BE1007, 23BE1008, and 23BE1010 with which a determination of National Register eligibility can be made.

Site 23BE1009 had previously been determined to be non-eligible for inclusion on the National Register of Historic Places (Purrington 1981:89). As is demonstrated in this report, only site 23BE1010 appears to meet the criteria for inclusion on the National Register. 23BE1007 and 23BE1008 are of insufficient quality to be included on the National Register.

23BE1010 may be adversely impacted by the construction of the proposed government projects. Specifically, this site may be affected by construction of a levee through its center, and by the protection of the shoreline from continued erosion through the installation of riprap. While the government right-of-way for these projects includes approximately 64 percent of this site, the levee would cover approximately 20 percent of the site and the installation of riprap would affect a maximum of 11 percent of the site. Adverse impact to 23BE1010 is expected to be restricted to the 11 percent associated with riprap installation.

ENVIRONMENTAL BACKGROUND

Sites 23BE1007, 23BE1008, and 23BE1010 are located in Benton County in west central Missouri. These sites are located within a 2 kilometer stretch along the Lake of the Ozarks portion of the Osage River. The Osage River Watershed is included within the Missouri River drainage basin. All three sites are situated on the Osage River flood plain, with 23BE1008 and 23BE1010 being exposed in the terrace cutbank formed by fluctuations in the level of the Lake of the Ozarks.

Physiography and Geology

The Downstream Truman Project area is located near the boundary between two major archaeological and physiographic regions of Missouri -- the Ozark Highland Region and the Western Prairie Region (Fig. 1). The Ozark Highland Region is moderately dissected with steep relief along its deeply incised streams. There are numerous small plateaus between basins on the surface of the Ozark Highland Region. The streams in the Ozark Highland Region have very sinuous channels with low meander wavelengths. In contrast, the Western Prairie Region is characterized by less deeply entrenched streams that form broader valleys with more rolling and gentle relief along the valley walls. Stream channels in the Western Prairie Region are less sinuous and have greater meander wavelengths as compared to those in the Ozark Highland Region.

The Western Prairie Region is divided into the Cherokee Lowland on the west and the Springfield Plain to the east (Fenneman 1938; Sauer 1920) (Fig. 2). This separation is primarily based on differences in the subsurface geology, as the underlying formations become progressively younger in a westerly direction (McMillan 1976:14). The older, uplifted Ordovician rocks exposed throughout the central Ozarks are overlain by Mississippian limestones in the Springfield Plain (Branson 1944:351; McCracken 1961). To the west, the Cherokee Plains are formed on younger Pennsylvanian shales (Fenneman 1938:613).

As McMillan points out (1976:14), basing the distinction between the Springfield Plain and the plains to the west simply on underlying formations is not acceptable to some. Branson (1944:350-351) notes that the hilly regions of the Springfield Plain grade almost imperceptibly into the surrounding plains regions, and contends "there is no structural, geologic, or topographic feature to set off the Springfield Structural Plains from the older plains further west..." Following this line of reasoning, the Missouri Geological Survey presently does not include the Springfield Plain under the general term of "Ozarks" (Bretz 1965:95).

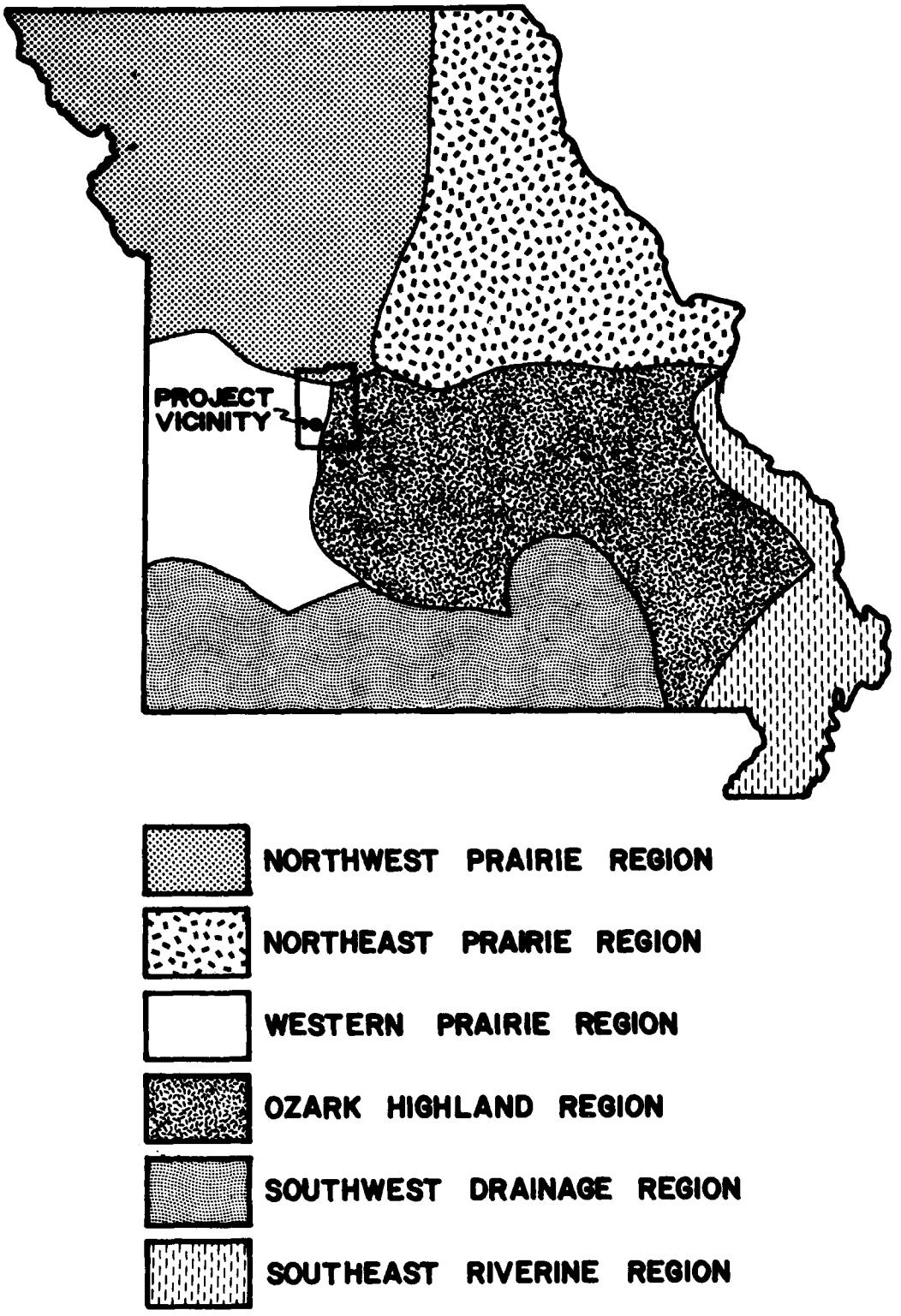


Figure 1. Archeological-Physiographic Regions of Missouri (after Chapman 1975).

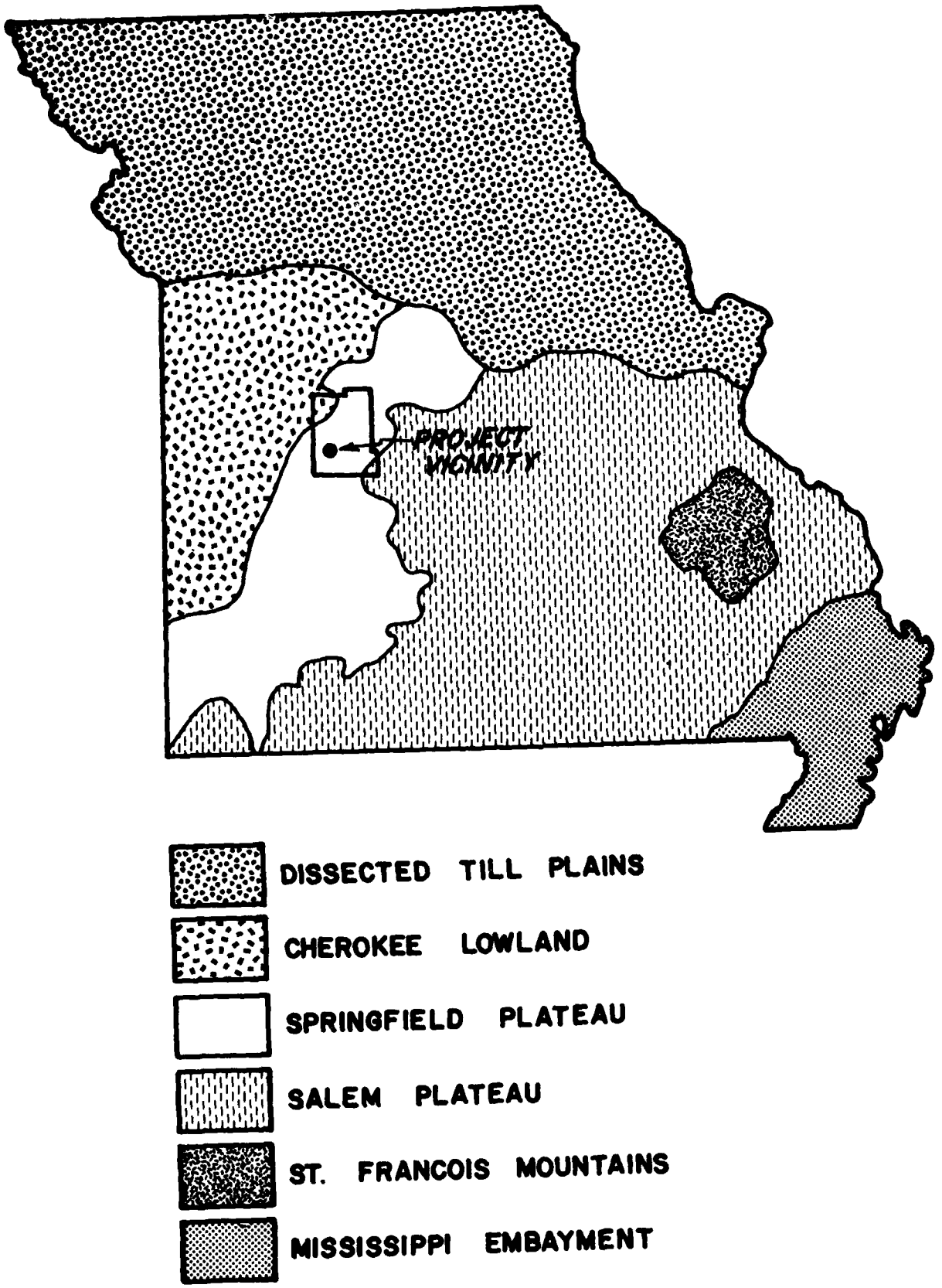


Figure 2. Downstream Truman project area and Benton County in relation to the physiographic provinces of Missouri (after Fenneman 1938).

The portion of the Truman Reservoir that is within the Ozark Highland Region (Salem Plateau) is restricted to the vicinity of the Pomme de Terre River and the lower segment of the Osage River. Bedrock is Ordovician in age and is composed primarily of the Jefferson City dolomite, a thick (60-75m) formation that contains abundant high-quality chert (Ward and Thompson 1977:8). Ridge tops contain scattered outcrops of younger Mississippian-age limestone (Roper 1981:66). Relief in this part of the reservoir may be up to 100 m or more and may contain steep, nearly vertical bluffs along the rivers. Rockshelters are common along the bluffs of the streams and rivers. Loess deposits are relatively thin in this area (.75-1.5m), and the loess has been completely stripped away in some places (Scrivner et al. 1975:7; Roper 1981:66).

The Ozark Highland Region and the Springfield Plain meet at the Eureka Springs Escarpment, which is the abutment of the Ordovician and Mississippian bedrock formations. Within the Springfield Plain, bedrock consists primarily of Mississippian-age formations (Ward and Thompson 1977:2; Anderson 1979). The major formations in this region are the Chouteau and Burlington limestones, both of which contain abundant chert (Roper 1981:68). Ordovician age deposits form the lower portions of valley walls. Relief is somewhat less than on the Ozark Highland Region and the uplands are gentler (Roper 1981:68). Rockshelters are still common along the bluffs of the streams and rivers (Fig. 3).

Alluvial Chronology

The alluvial sequence in the Truman Reservoir area has been studied extensively by various researchers (Haynes 1976, 1977, 1978, 1981; Ahler 1973, 1976; Brackenridge 1978, 1979, 1981). The bottoms of the major stream valleys contain an extensive system of Pleistocene and Holocene alluvial terraces that have been mapped in detail in the Breshear's Bottoms area of the Pomme de Terre River (Haynes 1976, 1977, 1981). Roper (1981:68) notes that the alluvial sequence of the Pomme de Terre River is comparable to the Osage River and some of its larger tributaries.

Haynes (1976, 1981) identified four alluvial deposits (T-0, T-1. T-2, and T-3) in the lower Pomme de Terre River valley (Fig. 4). Deposits T-0, T-1, and T-2 are further subdivided into alluvial cut-and-fill events (Fig. 4) dated by radiocarbon analysis. In some locations the terrace surfaces are so close in elevation that they are not distinguishable on the basis of elevation alone (Haynes 1981:497). The stratigraphic framework used in this report was presented by Haynes (1981) and represents a significant revision of earlier investigations (Brakenridge 1979, 1981; Haynes 1976, 1978).

The Breshears formation (T-3) is the oldest alluvial deposit mapped in the central Osage River basin. The T-3 terrace is mainly a strath of oxidized chert gravels with a strong red, relict paleosol (Haynes 1977). Haynes (1981:497) suggests that the Breshears formation is pre-Sangamon.

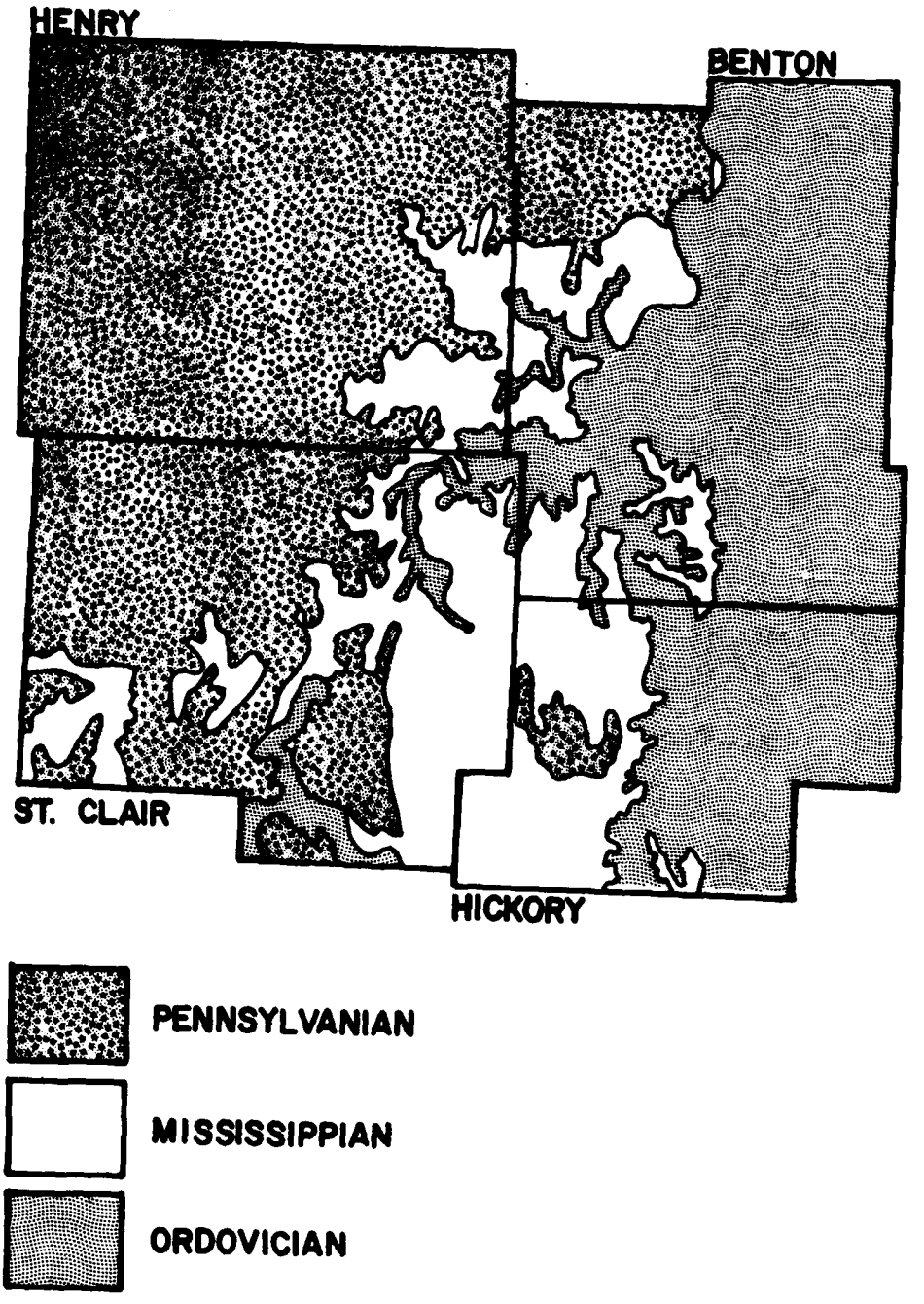


Figure 3. Major geological formations in the Truman Reservoir area.

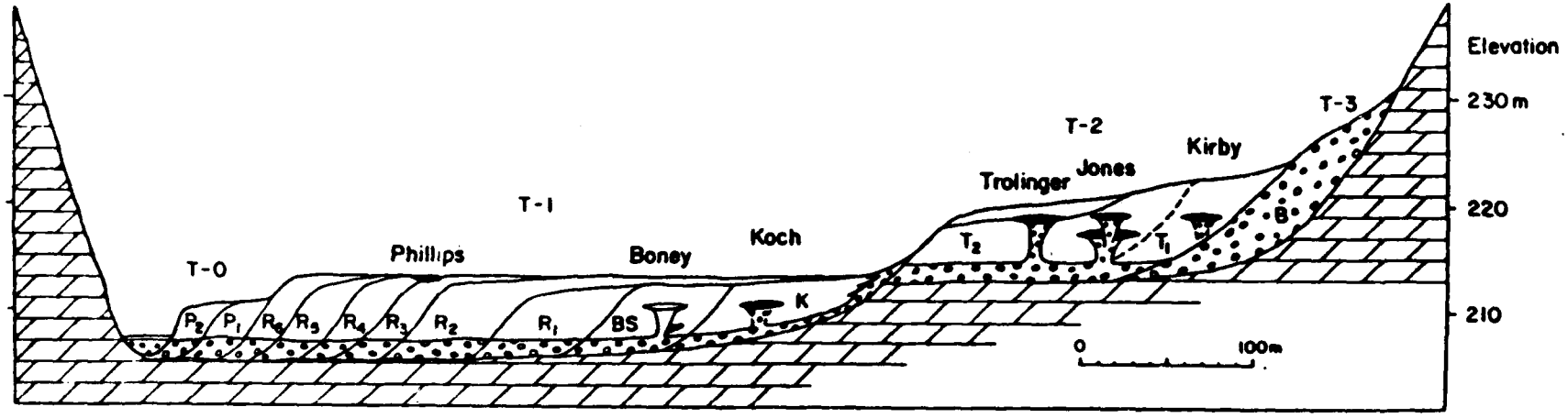


Figure 4. Generalized geologic section of alluvial terraces of the Pomme de Terre River. (Haynes, 1981)

However, due to its great age and resulting absence of radiocarbon dates, T-3 can be distinguished only on the basis of its elevation above river level.

The Trolinger formation (T-2) is approximately 14 m above the modern streambed. The T-2 alluvium is composed of about 9 m of red and gray mottled silty clay and clayey silt with lesser portions of clayey sand and gravel lenses, covering 1 to 2 m of subangular to subrounded chert gravel (Haynes 1981:500). Radiocarbon dating of well-preserved wood and plant fragments indicate that all of the Trolinger formation is in excess of 35,000 years old. A finite radiocarbon date of 48,000±900 B.P. was obtained on a juniper (Juniperous virginiana) log at the base of the upper third of the formation, and an experimental uranium-series date of 160,000 B.P. was obtained on mastadon tooth enamel from the same level (McKinney 1979). After the abandonment of the T-2 terrace the Pomme de Terre incised its channel approximately 2 m deeper into bedrock before aggradation of Koch alluvium formed the next lower terrace, T-1a (Haynes 1981:509).

The Koch alluvium is yellowish-red and gray mottled silty clay underlying the 6.7 m T-1a terrace level. Radiocarbon dates for Koch alluvium indicate an age range from about 30,000 B.P. to more than 38,000 B.P. (Haynes 1981:511). A paleosol on the upslope part of the Koch alluvial terrace is truncated by the contact with the Rogers overbank deposit indicating that the terrace tread may have been lowered by as much as a meter by flood scour (Haynes 1981:511).

An erosional hiatus of 4,000 to 6,000 years separates abandonment of the Koch terrace (T-1a) from the beginning of the Boney Spring terrace (T-1b) (Haynes 1981:511). The Boney Spring terrace is composed of two sedimentologically distinct members. Radiocarbon dates indicate that the lower member began deposition around 26,440±1,170 B.P. and by ca. 22,000 B.P. this aggradation had reached to the level of the modern flood plain (Brakenridge 1980:69; Haynes 1981:511). The upper member, which is less than 1 m thick, was deposited between ca. 22,000 and 13,550 B.P. A hiatus in the Boney Spring sequence occurs sometime between 13,000 and 7,000 B.P., which can be narrowed down further on the basis of radiocarbon dates as old as 10,500 B.P. from the base of the Rodgers alluvium (T-1c) at Rodgers Shelter (Haynes 1981:513). Therefore, abandonment of the Boney Spring terrace occurred between ca. 13,000 and 11,000 B.P. (Haynes 1981:513).

Terrace T-1c, known as the Rodgers alluvium, was deposited in four episodes (T-1c1 - T-1c4) between ca. 11,000 and 1,000 B.P. (Ahler 1976; Haynes 1981). The surfaces of these fills collectively make up the T-1c terrace level. The alluvium is younger than the 13,550 ^{14}C yr B.P. date from the uppermost Boney Spring alluvium (T-1b) and older than the 840 ^{14}C yr B.P. date on the Pippins alluvium (T-0). Radiocarbon dates from T-1c1 indicate that approximately 4.6 m of alluvial silt were deposited

between 10,350 and 8,100 B.P. or 0.20 cm/yr (Haynes 1981:515). Then 1.9 m of alluvium (T-1c2) was deposited between 8,000 and 6,300 B.P. at a rate of 0.11 cm/yr (Haynes 1981:515). The radiocarbon dates leave no time for the hiatus clearly indicated by soil development followed by erosion between T-1c2 and the surface of T-1c1 (Haynes 1981:515). During this time the Pomme de Terre degraded to at least 2.8 m of the present streambed. The T-1c2 alluvium was overlain by colluvial, mostly chert, gravel of the T01c3 dating between 6,300 and 5,200 B.P. Sometime between 6,000 and 5,400 B.P. the river had degraded to at least 1.7 m below the top of the Rodgers Terrace (Haynes 1981:515). It is not known if it had cut all the way to bedrock. An epicycle of cutting and filling occurred between 3,600 and 1,500 B.P., during which time the T-1c4 alluvium was deposited. The T-1c4 deposit is a mixture of alluvial silt and colluvial gravel. The Rodgers terrace was abandoned by the Pomme de Terre River after 1,500 B.P.

The Rodgers alluvium is characteristically a reddish brown clayey silt. This sediment is slightly clayier than the younger Pippins alluvium, and is likely to show more soil development as compared to the T-0 terrace (Joyer 1981:417). Rodgers alluvium is probably derived from the reworking of loess, older alluvium and some residual soils in the Osage River's drainage basin (Ahler 1973).

Terrace T-0, 2.5 - 3.0 m above river level, is the modern flood plain. The T-0 sediment is generally a dark brown clayey silt, known as the Pippins alluvium. This terrace began forming around 1,000 B.P. and continued to aggrade until after 600 B.P., when downcutting occurred. A return to conditions of net aggradation took place shortly before 300 B.P. as evidenced by a charcoal date from Rodgers Shelter (Haynes 1981:525). Thus T-0 is a compound fill with a younger flood plain deposit (T-0b) inset against another older one (T-0a) (Haynes 1976:58; 1981:523). The T-0 terrace was an active flood plain until completion of the dam at Lake Pomme de Terre in 1960 prohibited further flooding.

Soils

Detailed soils maps, such as the modern surveys prepared by the Soil Conservation Service, contain information allowing inference of drainage; slope, vegetation and climate under which the soils formed; and other soil-forming factors. This information is invaluable to the present study because the analysis of a given soil affords information on the past processes that led to its formation. Unfortunately, of the four counties in the Truman Reservoir area, a modern soil survey has been published only for Henry County (Grogger and Persinger 1976). The soil survey for Benton County will not be completed until 1983. General soil association maps are available for the Truman area, including one prepared by Scrivner, Baker and Miller (1966) and the more recent general soil map by Allgood and Persinger 1979).

According to Allgood and Persinger (1979:34), the soils in the

Ozarks uplands are those of the Lebanon-Goss-Peridge association, described as "well drained and moderately well drained, loamy, clayey and cherty, deep and moderately deep soils and soils with fragipans on gently sloping to very steep uplands". These soils are alfisols formed on loess and limestone or cherty limestone (Allgood and Persinger 1979: 54).

Bottomland soils in the Ozarks are mapped as the Hartville-Ashton-Cedargap-Nolin association. This association is described as "deep, nearly level to gently sloping, somewhat poorly drained, loamy, bottomland soils" (Allgood and Persinger 1979:39). All of these soils are formed in alluvium.

Upland soils along the Ozark border are the Petridge-Wilderness-Goss-Pembroke association or less often, the Gerald-Creldon-Hoberg-Keeno association. The former are described as "deep, nearly level to very steep, well drained and moderately well drained loamy and cherty upland soils"; the latter as "moderately well drained and somewhat poorly drained, loamy and clayey, gently sloping to strongly sloping upland soils that have fragipans" (Allgood and Persinger 1979:30,32). The soils in both associations are alfisols formed in loess and/or cherty limestone. Bottoms in this area have the same Ozark Hartville-Ashton-Cedargap-Nolin association as described on the Salem Plateau (Roper 1981:72).

The predominant upland soil association in the prairies are the Haig-Hartwell-Deepwater and Newtonia-Summit-Barco-Snead along the South Grand River and Deepwater Creek in Henry County and northern St. Clair County and the Bolivar-Hector association along the Osage River in St. Clair County (Roper 1981:72). The Haig-Hartwell-Deepwater association is described as "deep, nearly level to strongly sloping, poorly drained to moderately well drained clayey and loamy, upland soils"; the Newtonian-Summit-Barco-Snead association as "deep and moderately deep, nearly level to moderately steep, well drained and moderately well drained, clayey and loamy upland soils" and the Bolivar-Hector association as "deep and shallow, gently sloping to very steep, well drained, loamy, upland soils" (Allgood and Persinger 1979:27-28). The northern two associations are primarily mollisols, formed over loess and shale on areas of gentle slope; the St. Clair County soils are alfisols and inceptisols developed over sandstone and shale (Allgood and Persinger 1979:53). The river valleys in the prairie are covered by the Hepler-Radley-Verdigris-Osage association. This association is described as "deep, nearly level to gently sloping, moderately well drained to poorly drained, loamy and clayey bottomland soils (Allgood and Persinger 1979:29).

It is important to note that although the soils in the study area have not been surveyed, investigations of soils in the lower Pomme de Terre River valley can be applied to the Osage River valley in the reservoir area. The soil survey for Henry County includes the northwest third of Truman Reservoir. Soils on Rodgers alluvium are here classified

within the Verdigris series. This series consists of "deep, moderately well drained, nearly level soils on first bottoms adjacent to streams. These soils formed in silty alluvium." (Grogger and Persinger 1976). This series is grouped with the Osage series and mapped as the Verdigris-Osage association.

Climate

The modern climate of the study area is classified as a B_1 humid mesothermal (Thornthwaite 1948). This continental-type climate is characterized by extremes in temperature and in moisture.

The mean annual temperature of the study area is 56.3°F. (13.5°C.) (U.S. Department of Commerce 1963). Descriptive summaries for the Warsaw weather station show January to be the coldest month, with a 60 year (1900-1960) average of 33.3°F. (0.7°C.), and July to be the warmest month, with a 60 year average of 79.4°F. (26.3°C.) (U.S. Department of Commerce 1963). The mean maximum and mean minimum temperatures for January and July are shown in Table 1.

TABLE 1

CLIMATIC DATA FOR THE STUDY AREA

Temperature	
Mean maximum - January	6.5° to 7.5°C
Mean minimum - January	-5.5° to -4.4°C
Mean maximum - July	32°C
Mean minimum - July	20°C
Growing Season	
Average date for last killing frost	April 5
Average date for first killing frost	October 30

Source: Adapted from Wood and McMillan (1976:19)

The mean annual precipitation for a 29 year period (1931-1960) at Warsaw is 38.8 inches (98.5 cm) (U.S. Department of Commerce 1963). Most precipitation in the study area occurs during late spring and early summer. This period of maximum precipitation is largely a result of frontal activity.

Maritime polar (mP) and continental polar (cP) air masses that flow into western Missouri during late spring and early summer usually converge with warm, moist maritime tropical (mT) air that is flowing north from the Gulf of Mexico. The overrunning of mP or cP air by warmer mT air often produces intensive rainfalls of short duration along the zone of convergence.

Precipitation in the study area is lowest during the winter months, with a 67 year mean of 2.08 inches (5.1 cm) for January (Roper 1981). Mean monthly precipitation then increases to a peak of 5.51 inches (14.0 cm) in June, drops off, rises to a secondary peak in September, then steadily declines for the remainder of the fall (Roper 1981). The amount of snowfall is greatest in January and February, with an average of 5.3 inches (13.5 cm) in those months.

The study area lies in the zone of the prevailing westerlies. Cyclonic frontal cells associated with invading pacific air masses are largely responsible for the short-term (daily and weekly) changes that affect the weather. The weather patterns are basically those described by Borchert (1950:29) for his Climatic Region IV, the wedge-shaped midcontinent area of tall grass prairies, often called the Prairie Peninsula. The major characteristics for the region are:

1. low winter rainfall and snowfall;

2. occasional major summer droughts with a tendency for major summer droughts to occur synchronously within the region; and

3. a continental source and trajectory of the mean airstream which blankets the region during dry periods.

Wood and McMillan (1976) note that the weather pattern for west-central Missouri produces frequent droughts that have tremendous ecological impact on ecotones. Since droughts tend to favor grasses over arboreal species, there is a tendency for a forest-prairie border, such as the one in the region, to shift, with the grasslands expanding and contracting in response to the fluctuating climate (Wood and McMillan 1976).

Flora

The project area is located in a transitional zone, or ecotone, between two major biomes of North America--the oak-hickory forest and the bluestem prairie (Fig. 5). The composition and distribution of these biomes have been described in detail by Sauer (1920), Dice (1943), Steyermark (1963), McMillan (1976) and King (1977, 1978).

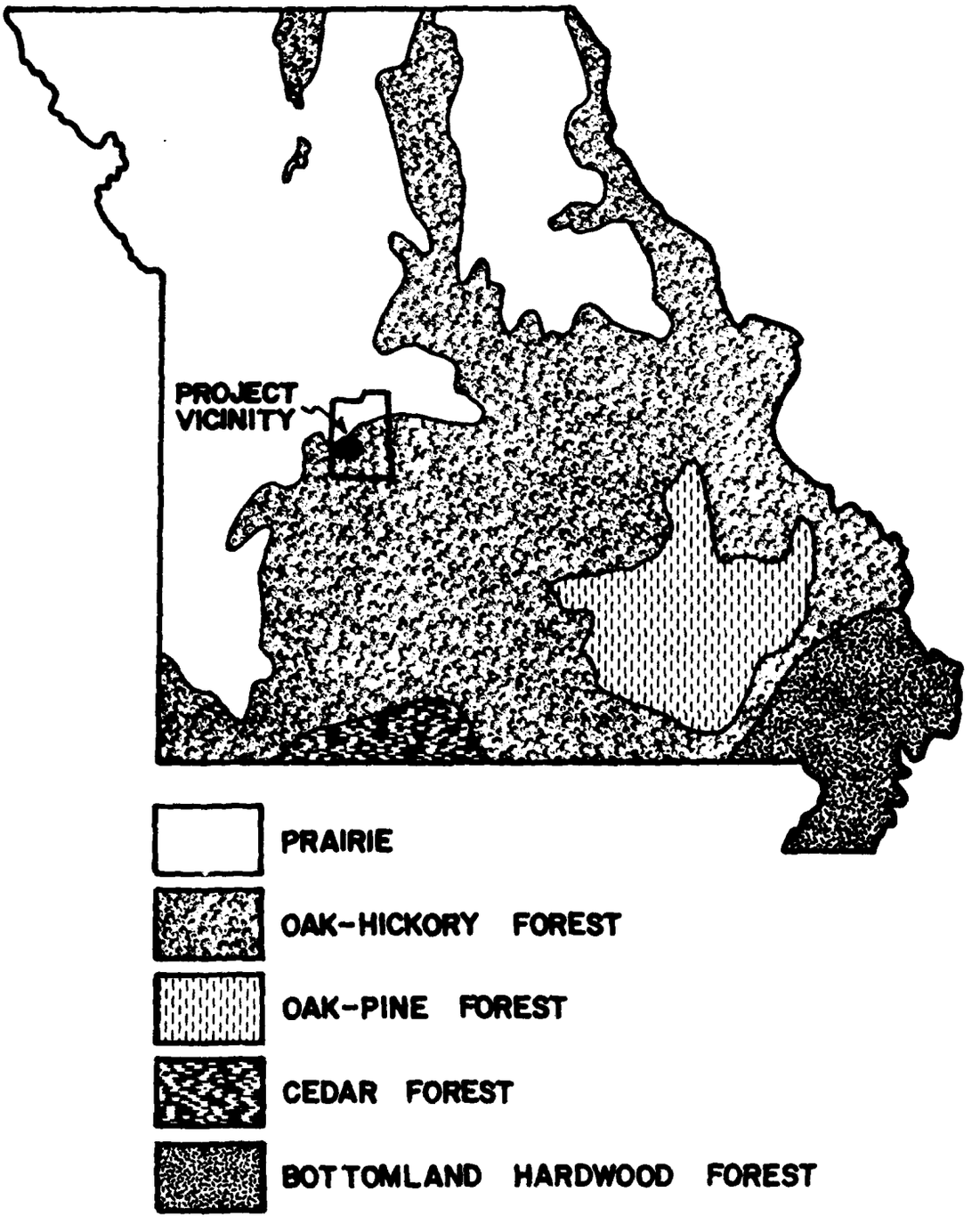


Figure 5. Downstream Truman project area and Benton County in relation to the major biotic provinces of Missouri.

Two major vegetation associations occur in the study area: (1) a mosaic of the oak-hickory forest and bluestem prairie, and (2) flood plain forest. The potential natural vegetation of the region is shown on Figure 6.

The mosaic of the oak-hickory forest and bluestem prairie is influenced largely by topography, bedrock, and soils. The oak-hickory forest is usually found on steep slopes, ravines and coarse-textured soils. The bluestem prairie is generally found on the level to rolling uplands with clay-rich soils. King (1977, 1978) clearly demonstrated the relationship between bedrock and slope, soil and bedrock, and vegetation and slope, in the area of Truman Reservoir. King (1977:36; 1978:7) shows graphically that level to gently rolling surfaces are very common on the Pennsylvanian-age sandstones and shales, with slopes exceeding 5% being rare. The areas of Mississippian and Ordovician limestones are characterized by a more rugged topography with the majority of the slopes exceeding 5%. Forests are rare on land with less than 2% slope but increase in occurrence as slope increases (King 1977:37; 1978:14). On the basis of these slope-bedrock relationships, it would be expected that the sandstone-shale bedrock would most frequently support prairie, with forest on the small areas of steeper slopes, and that the limestones would most frequently support forest, with prairie on the small level areas (Roper 1981:82). A comparison of Figures 3 and 5 shows that this is the case.

The oak-hickory forest is dominated by post oak (Quercus stellata), black oak (Q. velutina), black jack oak (Q. marilandica), white oak (Q. alba), bur oak (Q. macrocarpa), butternut hickory (Carya cordiformis), black hickory (C. texana), and white hickory (C. tomentosa). The major understory constituents of the oak-hickory forest are listed in Table 2. King (1978) has divided the forest into four types: bottomland, slope, upland, and barrens. The first three categories are obviously related to topography. The fourth category, "barrens", refers to a sparsely timbered open woodland. Curtis (1959:262) defines barrens as an area having more than one tree per acre but less than half the total area covered by tree canopy. Barrens are generally found in slightly rolling uplands where they take on combined characteristics of both forest and prairie (Roper 1981:84). The relative densities of arboreal species in each of these four categories is shown in Table 3.

The flood plains in the study area support the most diversified flora and series of microhabitats of any of the major plant communities in the Ozark Highlands (McMillan 1976:32). The ecological niches of this zone include the narrow area paralleling the base of the river bluffs, the flood plain proper, the riparian habitat bordering the streams, gravel bars, spring and slough borders, and aquatic communities. The dominant trees of the flood plain forest are bur oak (Quercus macrocarpa), black oak (Q. velutina), chinquapin oak (Q. prinoides), hackberry (Celtis occidentalis), sycamore (Platanus occidentalis), black walnut (Juglans nigra), box elder (Acer negundo), and several species of hickory (Carya spp.),

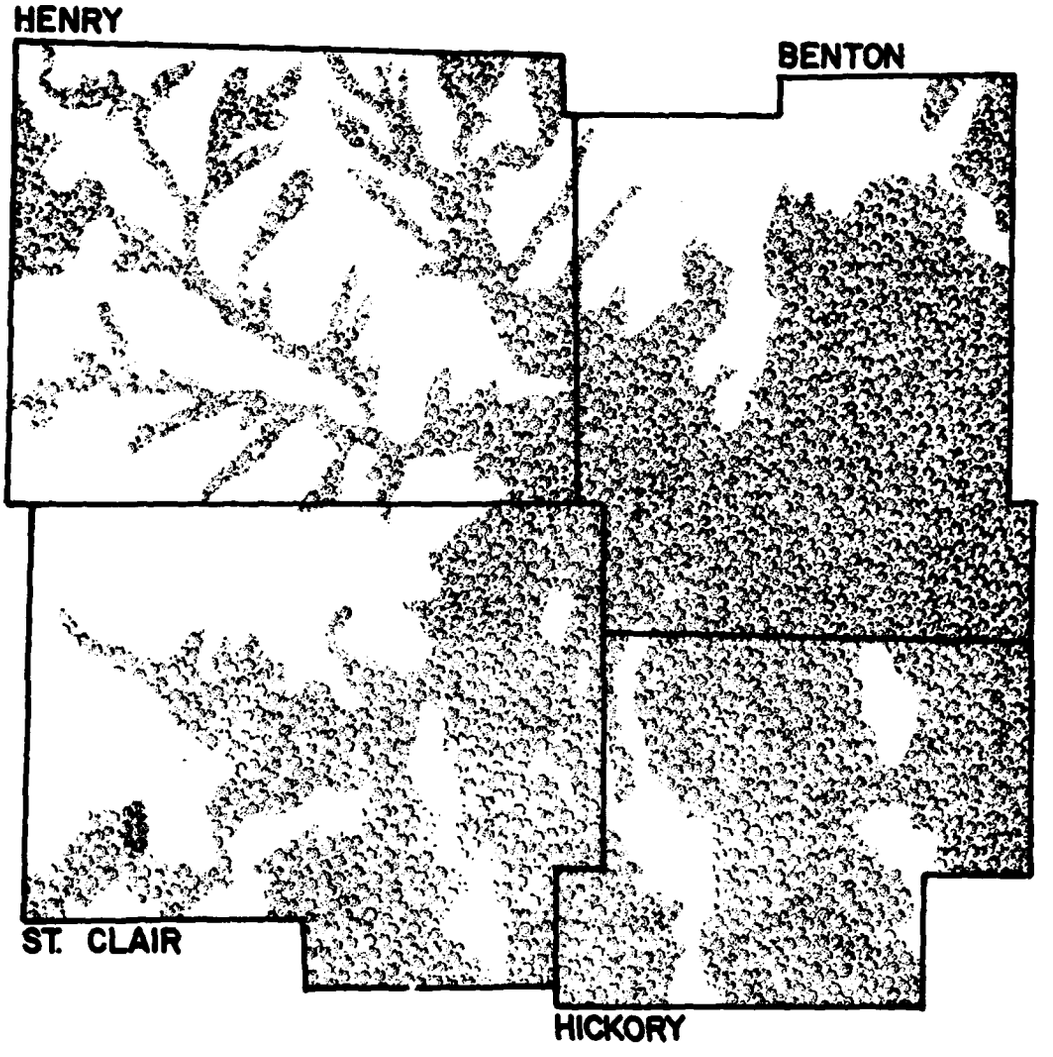


Figure 6. Potential natural vegetation in the Truman Reservoir area.

TABLE 2

Understory Constituents of Benton County Forests
(After King 1978:31-44) From Roper 1981

Upland

Spicebush (*Lindera benzoin*)
Rose (*Rosa* spp.)
Poison Ivy (*Rhus radicans*)
Dogwood (*Cornus* spp.)
Virginia creeper (*Parthenocissus quinquefolia*)
Greenbriar (*Smilax* spp.)
Bedstraw (*Galium* spp.)
Tick trefoil (*Desmodium* spp.)
Bush clover (*Lespedeza* spp.)
Pussytoes (*Antennaria neglecta*)
Mountain mint (*Pycnanthemum tenvifolium*)

Slopes

Fragrant sumac (*Rhus aromatica*)
Dogwood
Virginia creeper
Redbud (*Cercis canadensis*)
Buckbrush (*Symphoricarpos orbiculatus*)
Pussytoes
Goldenrod (*Solidago* spp.)
Bush clover
Tick trefoil

Lower slopes

Virginia creeper
Buckbrush
Grape (*Vites* spp.)
Spicebush
Gooseberry (*Ribes* spp.)
Pawpaw (*Asimina tribba*)
Touch-me-not (*Impatiens* spp.)
Violets (*Viola* spp.)
Wild ginger (*Asarum canadense*)
Nettles (*Laportea* sp.) (*Urtica* sp.)
Bloodroot (*Sanguinaria canadensis*)
Mayapple (*Podophyllum peltatum*)

Bottoms

Virginia creeper
Dogwood
Buckbrush
Trumpet creeper (*Campsis radicans*)
Grape (*Vitis* spp.)
Greenbriar

TABLE 3

Relative Tree Density - Benton County
(After King 1978:23) From Roper 1981

	Bottomland	Slope	Upland	Barrens
Post-oak	11.7	41.1	50.9	54.7
Black oak	18.0	26.2	18.9	20.0
White oak	8.1	12.6	-	4.0
Blackjack oak	1.8	6.2	18.9	2.7
Bur oak	18.9	1.1	1.9	-
Red oak	-	-	-	-
Chinquapin oak	1.8	2.3	-	1.3
Pin oak	7.2	3.0	1.9	2.7
Water oak	1.4	.2	-	2.7
Shingle oak	-	-	-	-
Oak (*Quercus* spp.)	-	-	1.9	-
Black hickory	.9	.2	-	5.3
White hickory	-	.2	-	-
Shagbark hickory	-	-	-	1.3
Hickory (*Carya* spp.)	5.4	4.7	3.8	4.0
Pecan	.9	-	-	-
Black Walnut	4.5	.8	-	1.3
Butternut	-	-	-	-
Elm (*Ulmus* spp.)	8.1	.8	-	-
White elm	3.6	-	-	-
White ash	.9	.2	-	-
Ash (*Fraxinus* spp.)	1.8	.4	-	-
Hackberry	.9	-	-	-
Honey locust	-	-	-	-
Sycamore	-	-	1.6	-
Persimmon	-	-	-	-
Red cedar	.9	-	-	-
Sugar maple	.9	-	.6	-
Maple	.9	-	-	-
Cherry	.9	-	-	-
Basswood	-	.2	-	-
	99.5	100.2	100.4	100.0

elm (Ulmus spp.), and maple (Acer spp.). The alluvial soils also support a dense understory of smaller bushes, vines and briers. Since the flood plains contain some of the richest agricultural lands in the region, much of the flood plain forest has been cleared for cultivation.

The bluestem prairie is composed of many forbs and few arboreals. The vegetation is dominated by little bluestem (Andropogon scoparius), big bluestem (Andropogon gerardi), switchgrass (Panicum virgatum), and Indian grass (Sorgastrum nutans). Other major components of the bluestem prairie are listed in Table 4.

Fauna

The Downstream Truman project area is situated between forest (the Ozark Highland) and prairie (Western prairie) environments. The junction of two distinct floral communities such as these creates what has been termed the "edge effect" (McMillan 1976:35). This situation results in a greater variety and density of fauna due to the convergence of grassland, forest, and ecotonal species in the environment.

Based on the archeological record, mammalian species appear to have been the most important faunal resource to the prehistoric inhabitants of the region. For example, at Rodgers shelter, mammalian species accounted for nearly 90 percent of all identified vertebrate remains (Parmalee, McMillan, and King 1976). Of importance, McMillan (1976) notes that the diversity of mammalian species on the prairie-woodland border is high. A list of these species indicating their preferred habitats is included here as Table 5. Of these mammals, the white tailed deer (Odocoileus virginianus) stands out as a staple due to its high frequencies on area archeological sites (Parmalee, McMillan, and King 1976).

Apparently of lesser importance to the areas prehistoric inhabitants were birds, amphibians, reptiles, and fish (Roper 1981:101-103). McMillan (1976:38) notes that economically important birds of the project vicinity included the forest-dwelling wild turkey (Meleagris gallopavo); the bobwhite (Colinus virginanus) inhabiting the ecotonal area; and the prairie chicken (Tympanuchus cupido).

Of 22 species of amphibians known to inhabit the project vicinity, Roper (1981:101) observes that none appear to have had any prehistoric economic importance. Reptiles, however, are mentioned by Roper (1981: 101-102) as commonly occurring on archeological sites in the Ozarks. The 19 species of reptiles known to inhabit the project vicinity are presented in Table 6.

Although McMillan (1976:39) identifies 98 species of fish common to the Ozark-prairie border area, Roper (1981:101-103) observes that fish are rarely found on archeological sites with good faunal preservation. Likewise,

TABLE 4

Principal Prairie Species
(after McMillan 1976b:26)
From Roper 1981

Big bluestem (*Andropogon gerardi*)

Little bluestem (*Andropogon scoparius*)

Indian grass (*Sorghastrum nutans*)

Wild rye (*Elymus canadensis*)

June grass (*Koeleria cristata*)

Dropseed (*Sporobolus heterolepis*)

Switch grass (*Panicum virgatum*)

Slough grass (*Spartina pectinata*)

Sideoats grama (*Bouteloua certipendula*)

TABLE 5. MAMMALS OF THE TRUMAN RESERVOIR AREA

	Prairie	Forest Border	Oak-Hickory Forest	Bottomland Forest	Bottomland Prairie
Order Marsupialia					
Opossum		2	2	1	
Order Insectivora					
Short-Tailed Shrew			2	1	
Least Shrew	1	2			
Eastern Mole	1	2			
Order Chiroptera (11 Species)		2	2	1	2
Order Lagomorpha					
Black-Tailed Jackrabbit	1				
Eastern Cottontail Rabbit		1			
Order Rodentia					
Woodchuck		2	1	2	
Thirteen-Lined Ground Squirrel	1	2			
Eastern Chipmunk		2	1		
Eastern Grey Squirrel		2	2	1	
Eastern Fox Squirrel		1	2	2	
Southern Flying Squirrel			1	2	
Plains Pocket Gopher	1	2			
Beaver					
Western Harvest Mouse	1	2			
Fulvous Harvest Mouse	1	2			2
Prairie White-Footed Mouse	1	2			
Woodland White-Footed Mouse		2	1	2	
Common Cotton Rat	2	1			
Eastern Wood Rat		2	1	2	
Southern Bog Lemming				2	1
Prairie Vole	1	2			
Meadow Vole					1
Pine Mouse		2	1		
Muskrat					
Meadow Jumping Mouse				2	1

1 = primary habitat
2 = secondary habitat

TABLE 5 (cont'd.). MAMMALS OF THE TRUMAN RESERVOIR AREA

	Prairie	Forest Border	Oak-Hickory Forest	Bottomland Forest	Bottomland Prairie
Order Carnivora					
Coyote	1	2	2		
Grey Wolf		2	1	2	
Red Fox		1	2		
Grey Fox		2	1		
Black Bear			2	1	
Raccoon			2	1	2
Long-Tailed Weasel	2	2	1		
Mink				1	
Badger	1	2			
Spotted Skunk	1	2			
Striped Skunk		1	2	2	
Bobcat		2	1	2	
Mountain Lion		2	1	2	
Order Artiodactyla					
White-Tailed Deer		1	2	2	2
Elk			1	2	2
Bison	1				

1 = primary habitat
2 = secondary habitat

TABLE 6. REPTILES OF THE TRUMAN RESERVOIR AREA (after Roper 1981).

Species	Habitat
Common snapping turtle	Aquatic, muddy ponds & streams
Stinkpot	Aquatic, muddy ponds & streams
Three-toed box turtle	Brushy, timbered hillsides to open flat areas
Ornate box turtle	Prairie
Map turtle	Aquatic, bays & backwaters of larger streams
Mississippi map turtle	Aquatic, bays & backwaters of larger streams
Ouchita map turtle	Aquatic, quiet sections of rivers
Western painted turtle	Aquatic, shallow water in mud bottom sloughs & ponds
Red-eared turtle	Aquatic, quiet, vegetation around water
Western spiny soft-shelled turtle	Aquatic, rivers with soft mud bottoms
Smooth soft-shelled turtle	Aquatic, rivers with soft bottoms
Eastern collared lizard	Rocky ledges
Northern fence lizard	Open timbered hillsides
Western slender grass lizard	(Rare - habitat uncertain)
Six-lined racerunner	Sparsely wooded hilltops
Ground skink	Wooded areas
Five-lined skink	Moist wooded areas
Broad-headed skink	Arboreal
Southern coal skink	Moist areas (eastern part of reservoir only)

while the rivers in the area are known to have large populations of fresh water mussels, they represent an infrequent part of the archeological assemblage of the area.

PREHISTORIC BACKGROUND

Introduction

This brief prehistory of the Osage River Basin is modeled primarily after Roper's (1981) summary of Truman Reservoir studies and Chapman's (1975, 1980) prehistory of Missouri and will serve as the background for the archaeological investigations conducted at sites 23BE1007, 23BE1008, and 23BE1010 located downstream from the Harry S. Truman Reservoir. The prehistory of Missouri has been divided into five major cultural periods (Fig. 7). These are the Paleo-Indian, 12,000 B.C. to 8,000 B.C.; Dalton, 8,000 B.C. to 7,000 B.C.; Archaic, 7,000 B.C. to 1,000 B.C. (which is subdivided into Early, Middle and Late); Woodland, 1,000 B.C. to A.D. 900 (also subdivided into Early, Middle and Late); and Mississippian, A.D. 900 to A.D. 1700 (Early, Middle and Late).

Paleo-Indian Period

The Paleo-Indian Period in North America is a distinct cultural tradition appearing between 12,000 B.C. and 8,000 B.C. Chapman (1975:30) refers to this culture as Early Hunter, with characteristics including fluted projectile points and knives along with a profusion of snubbed-end flake scrapers, side scrapers, drills, groovers, and graving tools. Hunting -- in some instances big-game hunting -- with these uniquely fluted forms was the major means of subsistence for these nomadic people. Few of these fluted forms have been reported in the Western Prairie and Ozark Highland regions of Missouri (Chapman 1975:73; Roper 1981).

Dalton Period

With the end of the Pleistocene, climatic changes characterized by a generalized warming trend occurred throughout North America. Cultural adaptations to this new ecological order resulted in the replacement of Paleo-Indian technologies with a new tradition of hunting and foraging during the Dalton Period. This hypothesized period of transition between the hunting tradition of the Paleo-Indian period and the Hunting-Gathering tradition of the Archaic period took place between 8,000 and 7,000 B.C., and is characterized by complexes containing strong similarities to both Paleo-Indian and Archaic traditions.

Dalton period materials have been found in the Harry S. Truman Reservoir at the Pippins Site (23BE214), the Los Pedros Site (23BE472), and 23SR189. At 23BE214, a Dalton Point was recovered from the plow zone during test excavations. 23BE214 is an open site situated on an old,

TRADITION	PERIOD	ABSOLUTE DATE
	Historic	AD 1700
Village Farmer	Late Mississippian	AD 1450
	Middle Mississippian	AD 1200
	Early Mississippian	AD 900
Prairie-Forest Potter	Late Woodland	AD 400
	Middle Woodland	AD 1 1 BC 500 BC
	Early Woodland	1000 BC
Forager	Late Archaic	3000 BC
	Middle Archaic	5000 BC
	Early Archaic	7000 BC
Hunter-Forager	Dalton	8000 BC
Early Hunter	Paleo-Indian	12,000 BC
Unspecialized Hunter-Gatherer	Early Man	

Figure 7. Culture - Historical Chronology for Missouri (after Chapman 1975).

heavily eroded terrace above the Pomme de Terre River. At the Los Pedros Site, a shallow open site in the uplands above the Pomme de Terre River, a Dalton variant projectile point was found on the surface. 23SR189 is an open site situated on successive terraces above the Osage River. During the initial survey of this site, a Hardaway Dalton projectile point was found on the surface. Test excavations failed, however, to reveal any materials assignable to the Dalton Stage (Roper 1981:657-723).

Archaic Period

The Archaic period represents the time between 7,000 and 1,000 B.C. when foraging became the predominant mode of subsistence. According to Jennings (1968:109-111), the Archaic is indicative "of a fundamental lifeway not geared to any one ecosystem". The Archaic in Missouri has been divided into three subperiods: Early, 7,000-5,000 B.C.; Middle, 5,000-3,000 B.C.; and Late, 3,000-1,000 B.C. (Chapman 1975:30).

During the Early Archaic, tools utilized for collecting were added to the hunting and foraging tool kits of the Dalton Period. Life revolved around a semi-permanent hunting and gathering campsite. While there is currently no evidence of Early Archaic occupation of the Upper Osage vicinity of the Western Prairie Region, there are a few manifestations of this culture in the Lower Osage area of the Ozark Highland region. Corner-notched, bevel-edged points; expanding-based drills; snubbed-end flake scrapers; hafted scrapers; pebble manos; anvil stones; split bone awls; and flexed burials typify the Early Archaic in Missouri (Chapman 1975: 127-157).

Diversity characterized the Foraging Tradition when it was established as a broad cultural adaptation throughout Missouri during the Middle Archaic Period (Chapman 1975:127). From 5,000 B.C. to 3,000 B.C. a chipped stone and heat treating technique was employed to produce a new and distinctive variety of side-notched projectile point/knife. These points include such types as Big Sandy, White River Archaic and Hardin Barbed. New tools appearing at this time included the celt, full-grooved ground-stone axes, articles of twined fiber fabrics, ornamental bone and shell, and tools hewn from bone and antler. Hunting remained an important means of subsistence for these Middle Archaic people though foraging continued to increase in importance. Numerous sites tentatively affiliated with this Middle Archaic period have been identified and excavated in the Truman Reservoir area (Chapman 1975:158-183).

By the beginning of the Late Archaic period of 3,000 B.C. to 1,000 B.C., there was a general shift in subsistence which favored gathering to hunting. This period represents a time of intense adaptation to environments not previously exploited. Lithic technologies varied greatly from preceeding periods and emphasized those items essential to the collecting, preparation and storage of vegetable matter. This shift,

however, did not occur in all physiographic regions, and does not apply to all of Missouri. The Western Prairie and Ozark Highland regions retained a dominant hunting economy throughout the entire Archaic Period and in some instances far beyond it.

There is evidence, however, of both incipient horticulture and pottery manufacture during the Archaic in the vicinity of the project area. Evidence for incipient horticulture occurs at about 4,000 B.P. at the Phillips Springs site in Hickory County (Chomko 1978). What some feel to be fiber tempered pottery occurs at Archaic Nebo Hill sites in the Kansas City area (Reid 1978:187; Schmits 1982:441).

Woodland Period

The Woodland Period is typified by continued cultural adaptations and efficient exploitation of a diversity of ecological environments. In the Northeastern portion of the United States the widespread manufacture of pottery and mound building heralds the arrival of the Woodland Period, and serves as a more tangible marker for this period than horticulture (Ritchie 1962:583-584). Since it is a relatively nonportable item, pottery is generally seen as an indicator of permanent settlements, often associated with food production. The Woodland period is subdivided into three phases; Early, 1,000-500 B.C.; Middle, 500 B.C. - A.D. 400, and Late, A.D. 400 - A.D. 900.

There is no definite evidence that mound building had reached Missouri by the Early Woodland Period, or as Chapman terms it, the Forest Potter Tradition (Chapman 1980:9). Although possibly introduced during the Late Archaic, pottery manufacture was widespread by the Middle Woodland Period. This early pottery type is characterized by grit or grog tempering and crude, conical shaped vessels.

In the Western Prairie and Ozark Highland regions, current evidence suggests that the Forager Tradition of the Late Archaic probably continued into Middle Woodland times (Chapman 1980:10). Settlements in this area would appear to be more of the hunting-gathering campsite variety rather than the typical base-camp settlements located elsewhere during this period.

Middle Woodland (500 B.C. to A.D. 400) pottery in Missouri is associated with the numerous cultural advances which were occurring simultaneously across the country through a network commonly known as the Hopewell Interaction Sphere (Chapman 1980:21). Religious and ceremonial ideas, artistic styles and raw materials were circulated through this broad and extensive network. Several regional Hopewellian centers developed throughout the Eastern United States, with the Kansas City and Big Bend centers being of greatest relevance to the Truman Reservoir area (Fig. 8) (Chapman 1980:23). Johnson (1976:13) summarizes Hopewellian development in the Lower Missouri Valley.

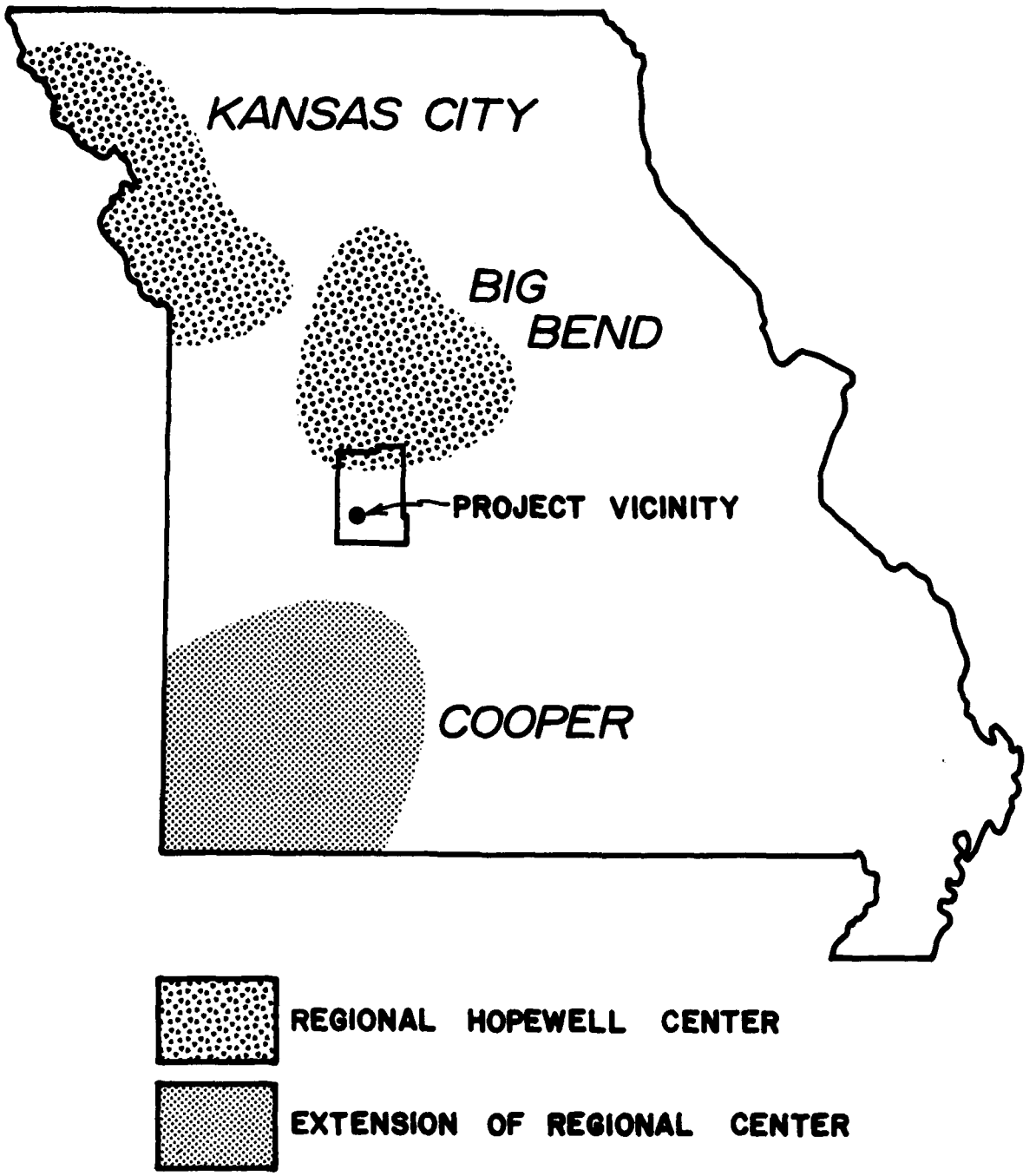


Figure 8. Regional centers and extensions of the Hopewell Interaction Sphere in Missouri (after Chapman 1980).

Stylistic changes in the manufacture and decoration of ceramics are the primary markers of Hopewell. Grit-tempered ceramics decorated with punctate; punch and boss; complicated, simple, and dentate stamp; zoned dentate; and crosshatch designs are a common Hopewellian commodity. Also attributable to Hopewell influence are artifacts such as the Stueben, North, and Snyder projectile points; large ovoid scrapers; triangular bifaces; small blades; lanceolates; rectangular digging tools; expanding-based drills and abraders (Chapman 1980:33-39).

These people of the Middle Woodland-Hopewell Period inhabited more sedentary base camps, subsisting by means of a highly diversified economy which included hunting, gathering, fishing, gardening, and other highly specialized means of environmental exploitation. Current data suggests that the Western Prairie and Ozark Highland regions were not occupied by the Middle Woodland-Hopewellian peoples on a permanent basis. Rather, these regions were apparently used solely for hunting and/or gathering expeditions or travel routes (Chapman 1980:26-28).

Between A.D. 400 and 600, the Hopewellian Interaction Sphere experienced a dramatic, still unexplained deterioration, marking the end of the Middle Woodland. The once extensive trade network disappeared, signaling major cultural change. During the Late Woodland, overall populations dispersed, gardening and specialized environmental exploitation were phased out while a renewed emphasis was placed on a more generalized hunting and gathering subsistence characterized by migratory base camps. A notable decline in the sophistication of artifacts occurred during this time. Pottery reverted to a simplistic, purely functional form; mortuary ceremonialism became less elaborate; there was a shortage of the exotic raw lithic materials once provided by the Hopewellian trade network; and the quality of lithic craftsmanship slipped (Chapman 1980:75-82).

Typical markers for the Late Woodland period include Scallorn, Rice Side-Notched and Young projectile points along with grit, sand and limestone tempered ceramics. Three Late Woodland sites -- 23BE337, 23BE653, and 23BE676 -- have been investigated in the project vicinity (Roper 1981). The Terre Baby Site (23BE337) is an open site situated along the Pomme de Terre River. Archaic, Middle Woodland and Late Woodland components were identified at this site characterized by "a large quantity of debitage but a rather sparse tool kit" (Roper 1981:795). The Late Woodland use of this site is seen as relatively casual.

The Cootie West Site (23BE653), located along the South Grand River, represents an open site with a dense midden deposit. The artifact assemblage from this site suggests that hunting and butchering; wood and hide working; and food preparation were practiced there. Unfortunately, detailed investigations at this site were not carried out before inundation by the waters of the Harry S. Truman Reservoir (Roper 1981:583-599).

Also situated along the South Grand River is the Cootie Site (23BE676). Having an intensive Late Woodland occupation between A.D. 700 and 1,000, this open site appears to have functioned in hunting and butchering; woodworking; drilling and engraving; vegetal food processing; and lithic manufacture (Roper 1981:890). Combination with this diversity of activities, the observed site size, density, and architectural remains indicate that this site probably served as a permanent or semi-permanent base camp (Roper 1981:829-891).

Mississippian Period

Chapman (1980:138) has designated the Mississippian period as the Village Farmer Tradition. This tradition extended across the Eastern United States and was represented by varying stages in cultural development. The Mississippians were full-time agriculturalists who resided in permanent villages and farmsteads associated with a fortified civic-ceremonial center comprised of an open courtyard or plaza surrounded by platform mounds. The Mississippian period has been divided into three subperiods based upon the occurrence of major cultural changes: Early A.D. 900-1200; Middle A.D. 1200-1450; and Late A.D. 1450-1700.

Groups which occupied the Ozark Highland region during the Late Woodland apparently maintained their Woodland adaptation through the Early Mississippian Period (Chapman 1980:152). These peoples apparently experienced little or no change in either lifestyle or implement assemblages. In the Western Prairie region no evidence of any permanent or semi-permanent village of this period has ever been found.

Although no dramatic cultural changes occurred during the Middle Mississippian, this sub-period represents the high point of cultural development for the Village Farmers. Urban planning was on a grander, more organized scale and arts and crafts reached their peaks. Population growth resulted in a proportionate expansion of urban and ceremonial centers and agricultural endeavors. The cultural growth in western Missouri, however, was sporadic and information on the exact chronological sequence of development is sorely lacking (Chapman 1980:228). During this time the Western Prairie region was utilized as a hunting area and/or travel route and bears no evidence of any type of permanent or semi-permanent occupation. The only known settlements in the Ozark Highland region are short-term, seasonal camps.

The Late Mississippian period is also commonly referred to as the Protohistoric Period. Cultural developments of the project area during this period are poorly understood. It is known, however, that by 1673 the Osage were inhabiting western Missouri, including the downstream project area (Bailey 1973:3-7). Until placed on a reservation in what is today Kansas in 1825, the Osage maintained and enlarged their territory in western Missouri (Bailey 1973).

PREVIOUS ARCHEOLOGICAL RESEARCH

Archeological research within the Harry S. Truman Dam and Reservoir has had a long and productive history. Starting with sporadic research in the 1950s and accelerating with National Park Service involvement in 1959, this research has led to the recordation, testing, and evaluation of thousands of archeological sites. Of central importance in this research has been the intensive investigations at 23BE125, better known as the Rodgers Shelter (Roper 1981).

Despite important research such as at Rodgers Shelter, and despite the long history of archeological investigations within the area, a 100 percent inventory of Truman Reservoir was never accomplished. The largest single survey -- conducted starting in 1975 -- covered only 25 percent of the area. Of significance, this survey was the first to attack on a large scale the problem of the evolution of the prehistoric settlement systems of the Central Osage River Basin.

Of specific importance to this report, an archeological survey of selected areas downstream from the Truman Dam and Reservoir was conducted by Purrington in 1980 (Purrington 1981). This survey resulted in the inventory of four prehistoric cultural resources, three of which serve as the subject of this report.

Despite the impressive amount of archeological activity at Truman Reservoir, very little is known of the Paleo-Indian occupation of this area. No fluted points were recovered from the reservoir projects, and only a few are recorded for the surrounding counties. While this has not been adequately explained, the lack of extensive deep testing in the area may serve as a partial explanation since it is possible, if not probable, that sites of this period are deeply buried in the alluvial deposits of the area flood plains (Roper 1981).

Dalton period materials are likewise scarce in the Truman Reservoir. While well represented at Rodgers Shelter, finds of Dalton materials in the remainder of the reservoir have been sporadic. As was suggested for the Paleo-Indian occupation of the area, this scarcity appears to be an artificial factor of site visibility. Like the earlier Paleo-Indian occupations, Dalton Period sites are expected to be deeply buried in alluvial deposits, an area that has received relatively little attention (Roper 1981).

The number of known archeological sites increases dramatically with the Archaic Period. Despite a large number of known sites, problems of

cultural historical reconstruction have remained severe. Due to the probability that certain types of Archaic sites are deeply buried under alluvial deposits, it is possible that our view of the Archaic settlement system is somewhat biased by our incomplete resource visibility.

Sites of the following Woodland Period are common in the Truman Reservoir area. Despite this abundance, it is apparent that deeply buried Woodland sites represent a rarely encountered portion of the settlement system. In general, the known Woodland sites for this area reflect few definite Early and Middle Woodland sites in comparison to the more common Late Woodland sites. Likewise, open Woodland sites are relatively scarce when compared to the more abundant Woodland Period rock shelter sites.

To date, only five undisturbed, open sites with buried or preserved sub-plow zone Woodland horizons have been located in the vicinity of Truman Reservoir. These sites include the Muller site in Benton County, which revealed Late Archaic and Woodland components to a depth of 3.2 meters (Iroquois Research Institute 1980:13); sites 23BE337 and 23HI216 (Phillips Spring), both located on the lower Pomme de Terre and possessing intact Woodland horizons (Purrington 1981:25; Chomko 1978); the Cross Timbers site (23HI297) where there is a distinctly stratified, lengthy occupation ranging from Early Archaic through Mississippian (Roper 1981); and the Cootie site (23BE676), which contains a deep Woodland component but which has been innundated by the waters of Truman Reservoir (Roper 1978:891). The Lotterer site, 23BE1010, is the sixth site featuring a completely undisturbed Woodland component in the Osage Valley.

This small number of intact open Woodland sites in the Truman Reservoir area immediately indicates the degree of significance inherent in each. This significance is made somewhat finite by the completion of Truman Reservoir, precluding further search for additional well preserved Woodland sites in a significant portion of the Osage River Valley for an indefinite but certainly significantly long length of time.

Special importance, however, can be attributed to the well preserved Woodland site which can be demonstrated to represent the locus of a specialized activity; which can be stratified into two or more components within the Woodland period; which is stratigraphically separable from earlier or later cultural horizons present at this same site; which have a high density and diversity of tool types which can be used to develop better understandings of temporal, typological and functional relationships within the site or within the Woodland Period in general; and/or that are characterized by a number of well preserved cultural features, which are rare on Woodland sites known for the area (Roper 1981:656-657). The presence of one or more of these characteristics on a well preserved Woodland site in the Truman Reservoir area can be seen to signal that site's significance for the development of a complete and realistic understanding of the prehistory of Missouri.

STUDY APPROACH

Introduction

Our field approach to the National Register testing of 23BE1007, 23BE1008, and 23BE1010 was designed to provide definitive information on vertical and horizontal extent, cultural-historical association, function, and state of preservation of these sites (Soil Systems, Inc. 1981). This information -- along with information on previous regional research and general research questions -- was felt to represent that information necessary to provide a statement on the potential National Register eligibility of these sites. Our analysis of the information on 23BE1007, 23BE1008, and 23BE1010 has been directed at the consideration of each site in relation to National Register criteria, with a case being developed for or against the potential eligibility of each site.

Field Methodology

The Gaylord Pasture Site (23BE1007)

According to Purrington (1981:51), "The Gaylord Pasture Site is located on the front edge of an older terrace at the edge of the main valley of the Osage River". Although the site is located adjacent to backswamps which probably represent an abandoned channel of the Osage River, relief in the vicinity of 23BE1007 is insufficient to allow a definition of the terrace sequence in this location. Furthermore, except for its proximity to the forementioned backswamps, site 23BE1007 cannot properly be described as existing on the leading edge of a terrace. 23BE1007 is located on a relatively flat alluvial plain created by the actions of the Osage River and slopewash from the uplands to the west.

Only six artifacts were recovered during SMSU's inventory of 23BE1007. These artifacts included one bifacial knife, one bifacial preform, three secondary decortication flakes, and one interior flake (Purrington 1981: 111-112). These six artifacts were reported as having originated within a ten-by-100 meter strip along the front edge of the terrace (Purrington 1981:51).

Since 23BE1007 was originally defined on the basis of a surface artifact scatter, our approach to the testing of this site involved a combination of surface and subsurface recovery techniques (Soil Systems, Inc. 1981). Our approach, however, relied on our ability to relocate 23BE1007 by the discovery of cultural material at the reported location of this site.

Close scrutiny of the surface in the vicinity of 23BE1007 did not result in the discovery of any definite cultural materials. As a result of recent plowing and planting of this area, visibility was excellent (about 75%) and shovel tests were not required. In order to verify that we were examining the proper location, the point identified as 23BE1007 on Purrington's maps (1981) was triangulated from landmarks common to these maps and the actual landscape. This exercise revealed that we had indeed examined the documented location of 23BE1007.

Although no surface indications of an archeological site were discovered, a test pit (Fig. 9) was excavated within the limits of the site as defined by Purrington (1981). This test pit measured 1 x 1 meter, 50 percent smaller than the 1 x 2 meter unit specified in the research design. This change was dictated by ground conditions at the time of this project. Due to extensive rain activity prior to and during this project, the clay soils were at best supersaturated, making reliable "dry" screening extremely difficult (Fig. 10). This test pit was excavated in arbitrary 10 cm levels to a depth of 30 cm, with an eight cm diameter auger excavation extending to one meter below surface (Fig. 11).

This test unit extended to the base of the modern topsoil zone. Based on our examination of the land surface at the purported location of 23BE1007, it is extremely unlikely that the cultural materials collected by Purrington originated below the plow zone, which extends to a depth of approximately 20 cms. Although Purrington (1981) describes this site as existing on the leading edge of a terrace, it is not and is instead situated on a fairly horizontal alluvial plain. Normal erosion and agricultural practices would not have resulted in the exposure of materials from a deeply buried site at this particular location. As a result, extensive testing below the modern soil horizon -- the only reasonable candidate for the origin of 23BE1007 -- was deemed inappropriate.

Due to the failure of our intensive surface examinations and 1 x 1 meter test unit to reveal cultural materials, it was impossible to better define the horizontal or vertical extents of 23BE1007.

The Kowertz Site (23BE1008)

Site 23BE1008 was originally defined on the basis of a scatter of prehistoric artifacts and debitage extending for 70 meters along the shore of the Lake of the Ozarks (Fig. 12). This material appeared to be eroding from the edge of the flood plain, possibly from the upper 30 cms. Since the precise origin of this cultural material was unknown, and since no prehistoric cultural materials could be observed on the surface, our approach to this site focused on a series of subsurface evaluation procedures (Fig. 13).

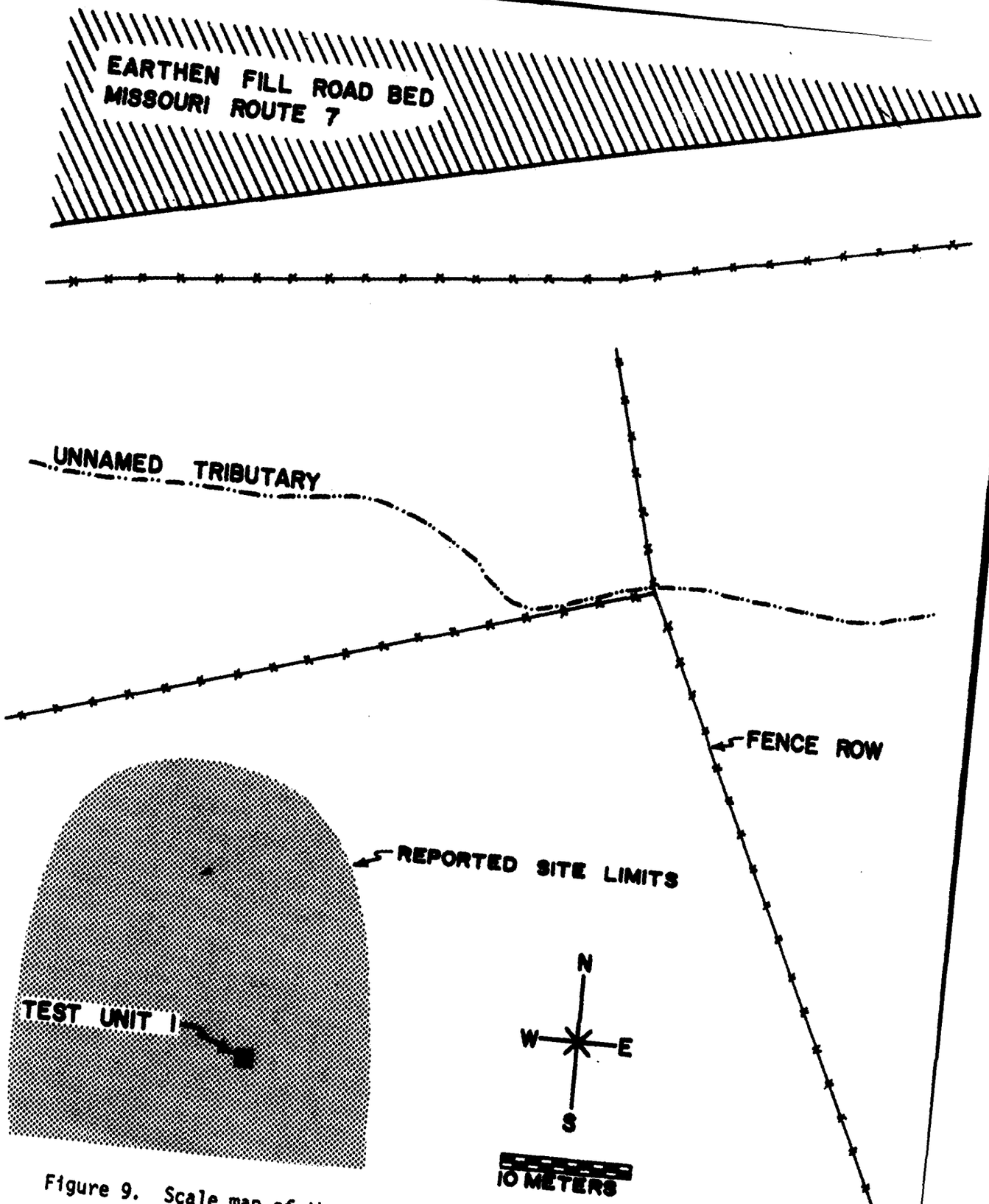


Figure 9. Scale map of the vicinity of 23BE1007 showing the location of Test Unit 1.

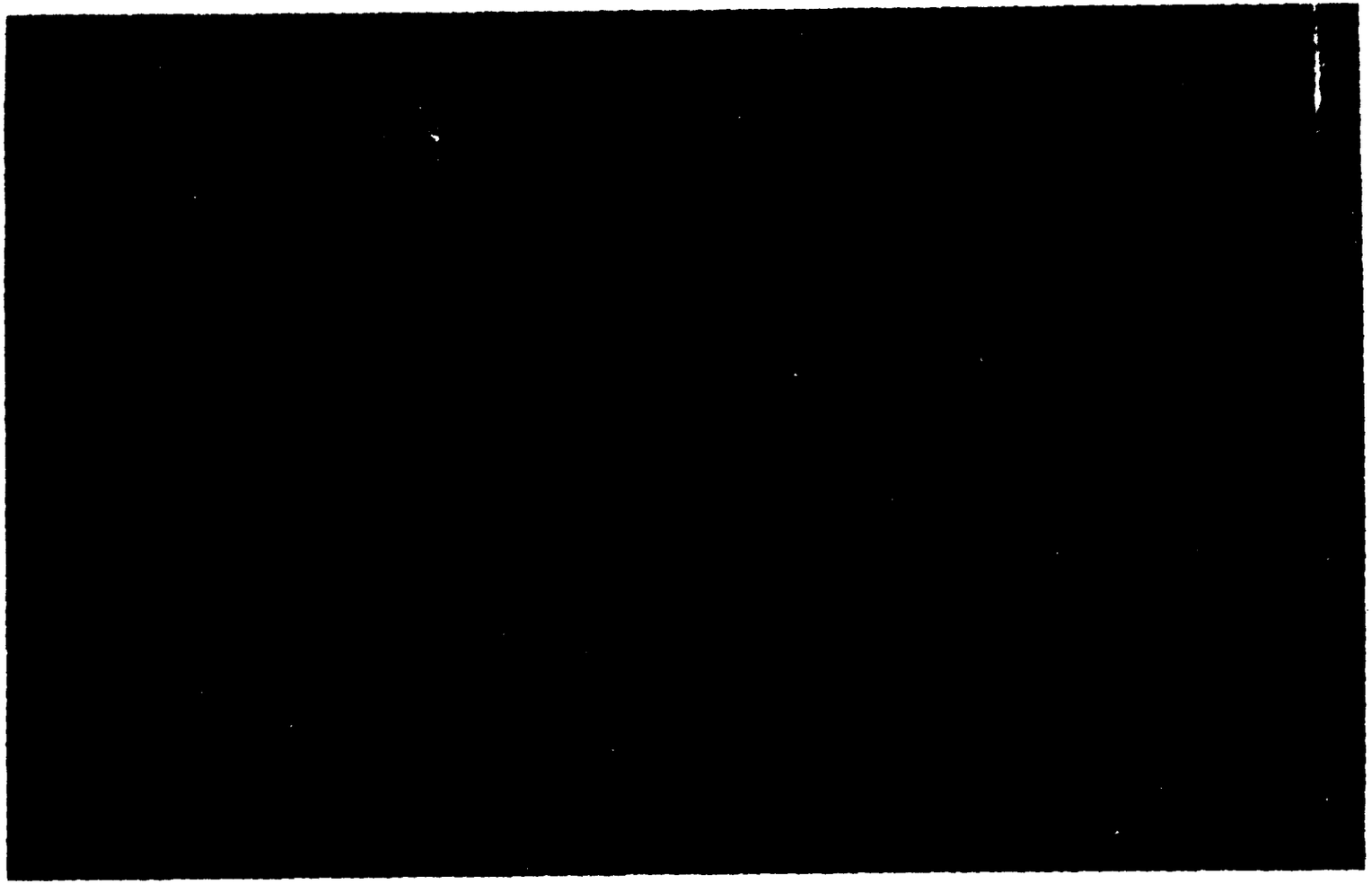


Figure 10. View of the vicinity of 23BE1007 showing water-logged conditions at the time of this project.

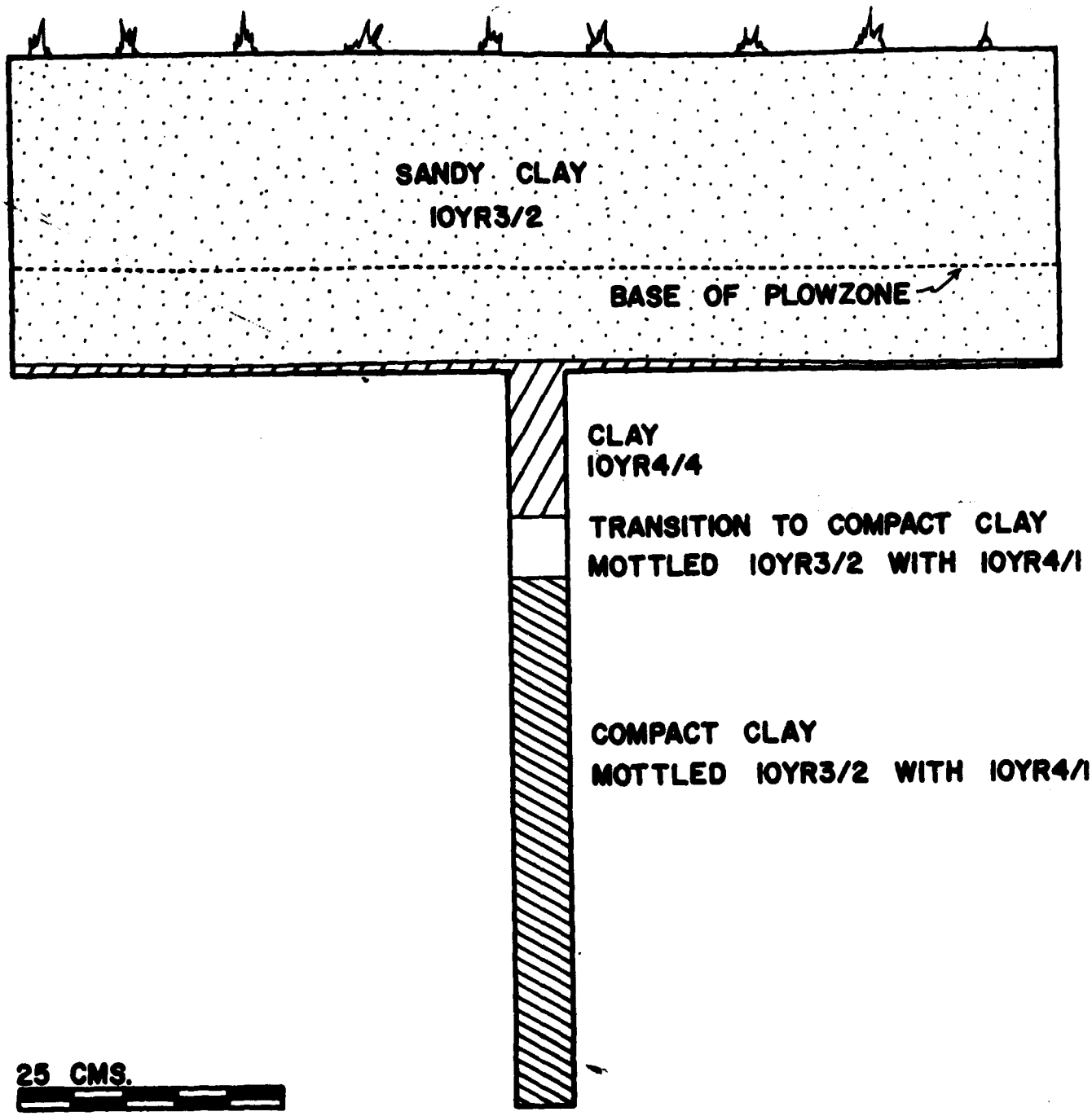


Figure 11. Idealized profile of Test Unit 1 at 23BE1007.

Figure 12. View of the lakeshore at 23BE1008 showing debris eroding out of the terrace edge.

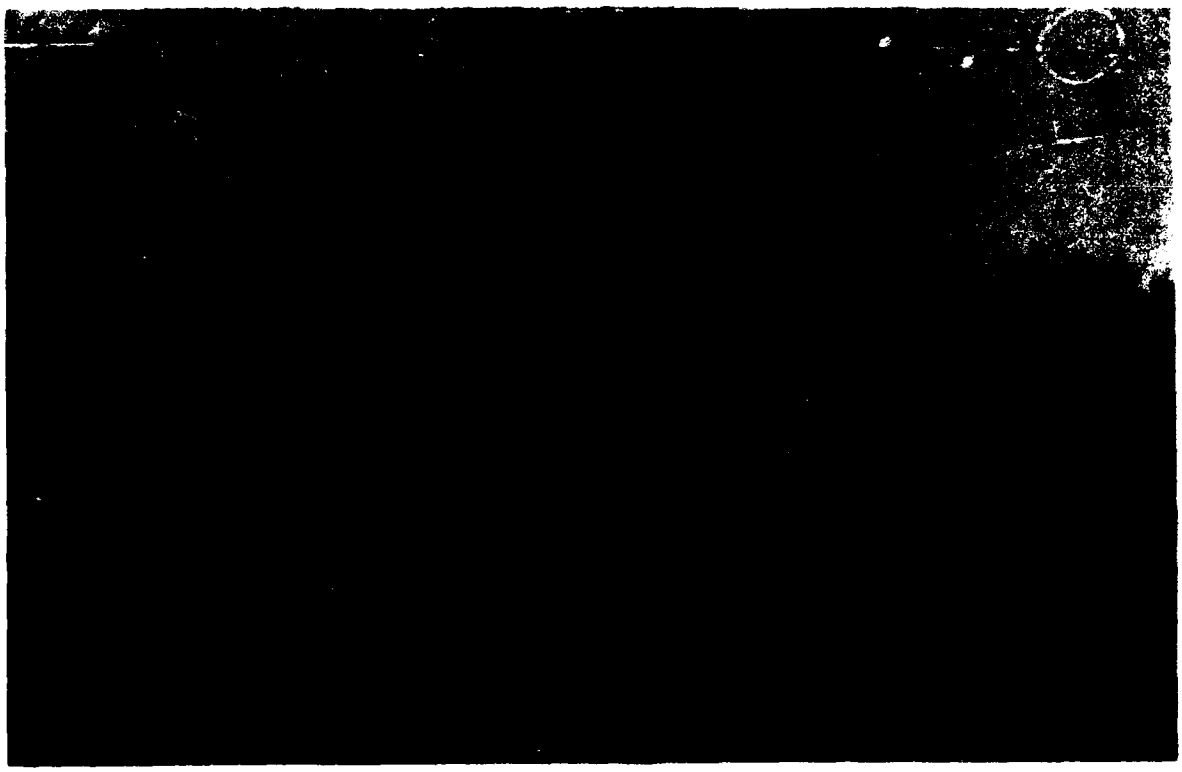


Figure 13. View of Backhoe Trench C at 23BE1008 during excavation.

These procedures included the hand excavation of a one-meter-square test unit, the excavation of five one-meter-wide backhoe trenches, the excavation of an 8 cm diameter auger core, and the cutting of three profiles in the cutbank along the shore of the Lake of the Ozarks (Fig. 14). This program of subsurface testing at 23BE1008 was specifically designed to provide information on (1) the origin of the prehistoric material observed on the shore of the Lake of the Ozarks and (2) the extent and characteristics of the site.

Our initial examinations at 23BE1008 relied on the cleaning of three vertical profiles along the river edge of the terrace (Fig. 14). These profiles were cut in an attempt to identify the origins of the cultural materials at this site.

Of the five backhoe trenches excavated at 23BE1008, three (A, C, and E) were placed adjacent to and perpendicular to the lakeshore within the observed artifact scatter along the shore. The remaining two trenches (B and D) were also perpendicular to the shore, but were located inland approximately 20 meters. Trenches could not be excavated at any greater distance inland because of the waterlogged conditions of the ground in that location. In general, trenches A through E were approximately 1.5 meters deep, with depth being limited by the depth of the water table (Table 7). Except for Trench B, which filled with water immediately after excavation, all trenches were profiled.

TABLE 7. BACKHOE TRENCHES AT 23BE1008.

TRENCH	LOCATION	LENGTH	MAXIMUM DEPTH
A	Terrace Edge	12 meters	1.30 meters
B	Terrace	11 meters	1.80 meters
C	Terrace Edge	11 meters	1.50 meters
D	Terrace	5 meters	1.60 meters
E	Terrace Edge	11 meters	1.50 meters

In order to extend our depth visibility, an 8 cm diameter auger was used to extend backhoe Trench A an additional one meter. With this auger core, our visibility at Trench A was extended to a total of 2.30 meters below the modern surface.

Our final subsurface exploration at 23BE1008 consisted of the excavation of a one-meter-square test unit to a depth of 30 cms. This

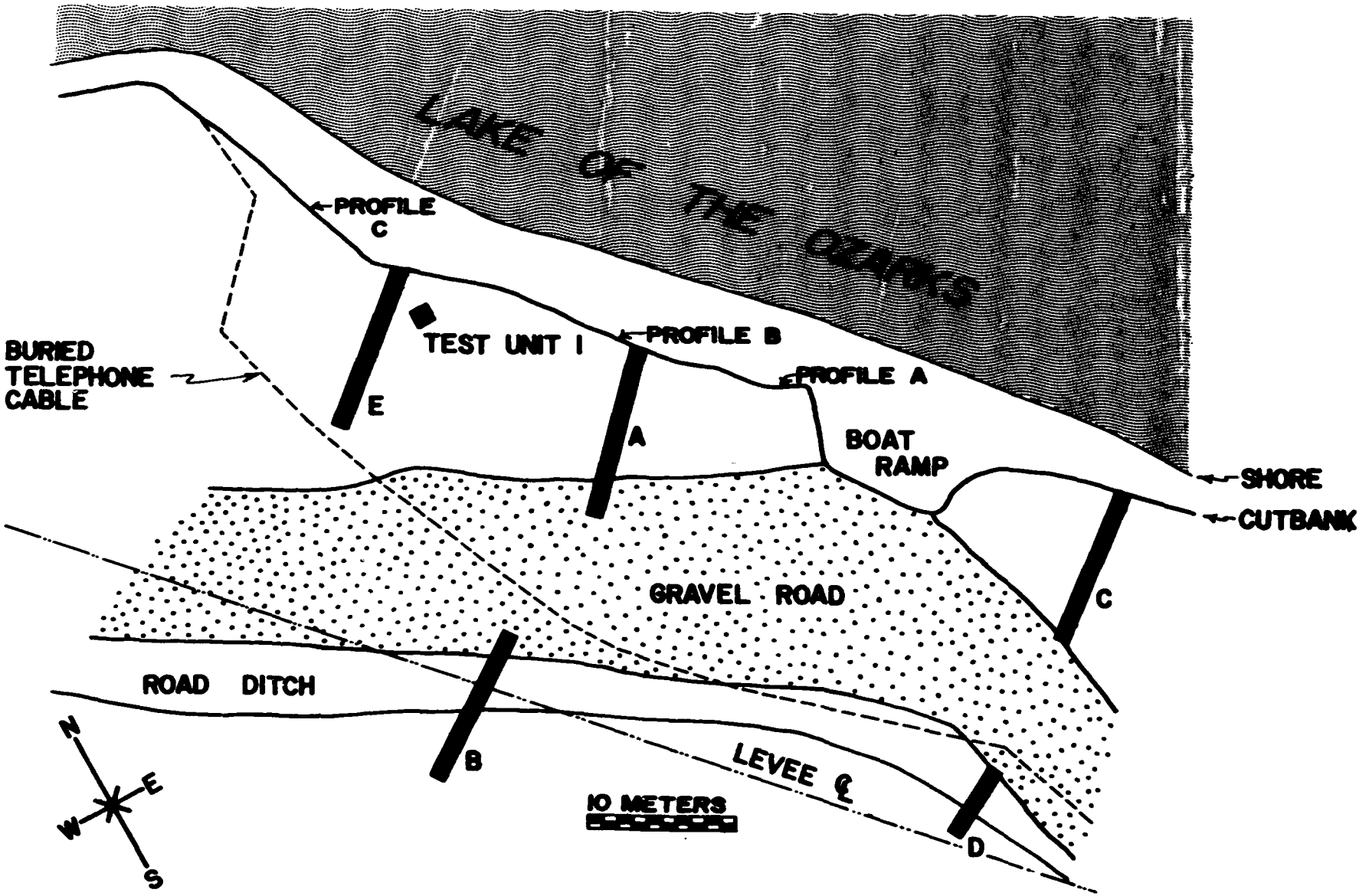


Figure 14. Scale vicinity map of 23BE1008 showing location of test units.

unit was placed adjacent to the terrace edge above the scatter of artifacts observed along the shore of the Lake of the Ozarks. Excavated and screened in arbitrary 10 cm levels, this unit was terminated at 30 cm due to the results of the adjacent backhoe Trench E and the material contents of the first three levels.

Backhoe Trench E revealed a rusty iron chain at a depth of 102 cms, significantly below a layer of chert debris from which the material observed on the shore had apparently eroded. Cultural materials recovered from the one meter unit included two shoelaces, two glass soft drink bottles, one glass canning jar with lid, one screw top plastic jug, three plastic bags, aluminum foil scraps, newspaper fragments, 17 steel beverage cans, and 14 aluminum beverage cans.

The Lotterer Site (23BE1010)

The Lotterer site was originally described by Purrington (1981:54), as consisting of

> a moderately dense scatter of prehistoric cultural material which was eroded from a bank of the Osage River (Lake of the Ozarks) and deposited along the shoreline. Cultural materials are also in situ in the alluvial deposits. They have been observed in a dark organic horizon about 1.75 to 2 meters below surface and in a lighter stratum about 1.50 meters below surface. Cultural materials extended about 80 meters along the shoreline...

Our research verified this description as essentially accurate (Fig. 15).

Since site 23BE1010 is a buried cultural resource, our evaluation of it relied almost entirely on subsurface testing, with some general information deriving from the out-of-context shoreline scatter. Two methods of subsurface testing were employed: backhoe testing and the excavation of a controlled test unit (Fig. 16).

The program of backhoe testing at 23BE1010 was designed to provide general information on the vertical and horizontal extent of this site and more detailed information on the geomorphological history of the site. The backhoe program relied on a primary transect of ten trenches (A-J) placed in a line perpendicular to the bank of the Lake of the Ozarks and bisecting the site as observed on the shore of this lake. In addition to this primary transect, two additional transects (Trenches AA-BB and AAA-BBB) were developed, and were oriented 45 degrees north and south of the primary transect. These transects proceeded away from the lakeshore to a point where (1) no additional cultural material was encountered or (2) water-related landscape conditions prevented the further extension of the transects.

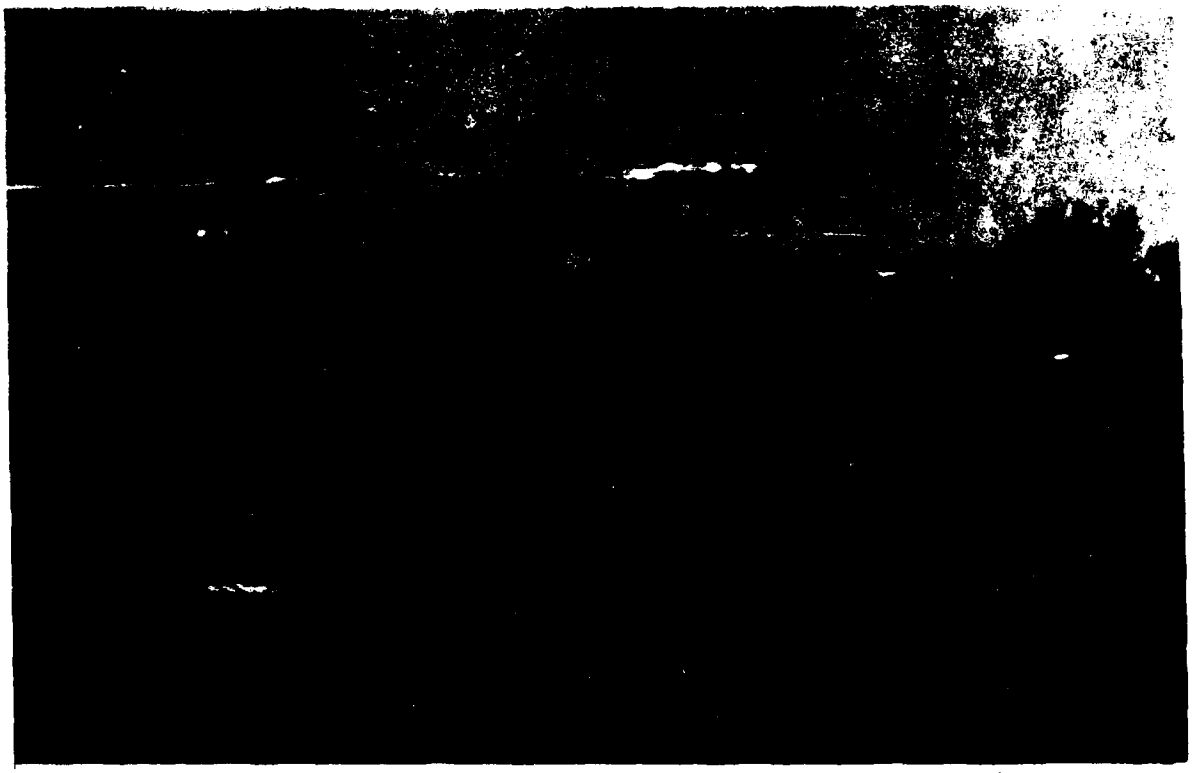


Figure 15. View of Site 23BE1010 from the opposite shore of the Lake of the Ozarks.

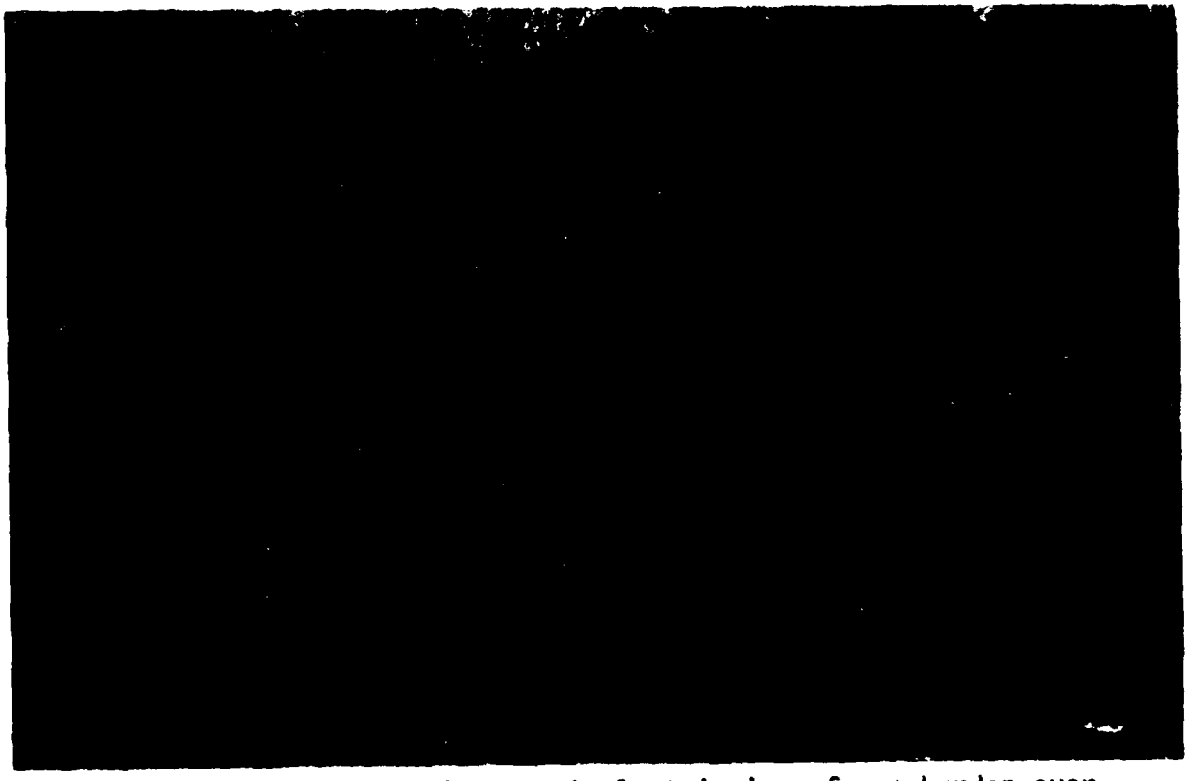


Figure 17. View of mechanical stripping of overburden over Test Unit 1 at 23BE1010.

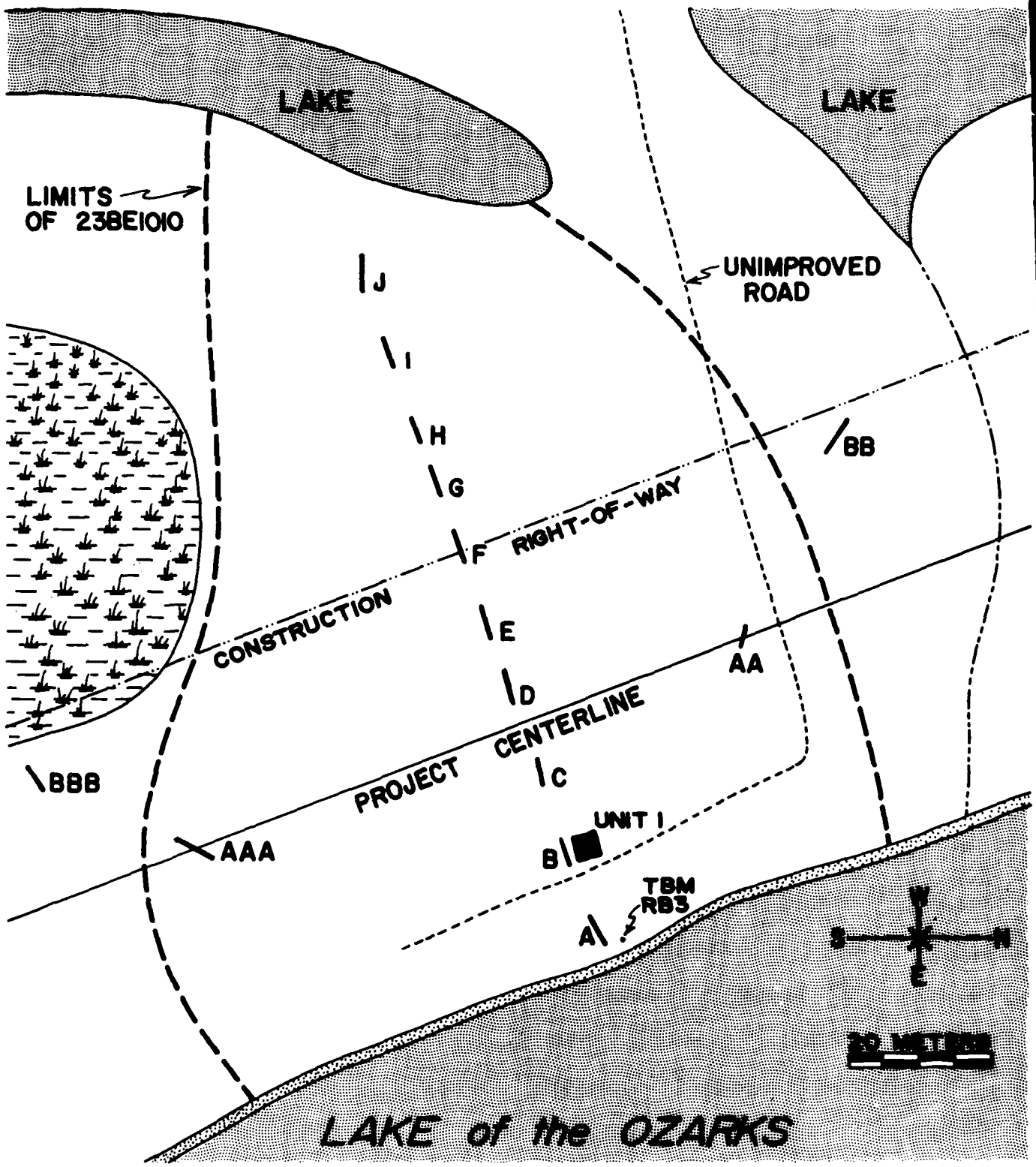


Figure 16. Plan of 23BE1010 showing site boundaries and the placement of test units and backhoe trenches.

The primary transect was terminated approximately 105 meters west of its inception at the shore of the Lake of the Ozarks due to its juncture with a meander lake. The two secondary transects were terminated due to the absence of cultural materials in Trenches BB and BBB and their proximity to swamps and drainages.

Unless a cultural feature was encountered (as in Trenches H and AA), trenches were excavated to a depth of approximately two meters. Unless rapid flooding prevented it (as with Trenches BB and BBB), all trenches were profiled.

The feature in Trench H (Feature #1) -- a hearth -- was mapped and removed. The feature in Trench AA (Feature #2) was profiled and mapped. Since this feature appears to represent a burned house, its excavation was felt to be beyond the scope of this project. Samples for radiocarbon dating were collected from Features #1 (Beta - 4257) and #2 (Beta - 4258) and have been processed by Beta Analytic Inc. The dates for these samples are presented elsewhere in this report (Appendix B).

Trenches B and H were examined by a geomorphologist and samples were collected for soils and pollen analyses. The results of these soils and pollen analyses are reported elsewhere in this report.

Our controlled excavation at 23BE1010 was conducted at a point immediately north of Trench B (Fig. 16). This point was selected as it could be easily correlated with our soils and pollen analysis from Trench B. This test unit was originally designed to be a 3 x 3 meter square. Upon completion of the first level, however, it was determined that soil conditions would make it impossible to provide for reliable artifact recovery from the originally sized unit within the available time. These soil conditions consisted of extremely wet soils with high clay content (see Table 9). Conventional "dry" screening of these soils was extremely tedious, and could only have been improved with sophisticated high pressure water screening technology. As a result, only the southwest one-quarter (1.5 meters square) was excavated below level 1. Information from this unit has proven adequate to our immediate needs.

The southwest quarter of Test Unit 1 at 23BE1010 was hand excavated from about 65 cms below the modern surface to a depth of 180 cms below the modern surface. Overburden above 65 cms was mechanically removed and was not observed to contain any cultural materials (Fig. 17). Excavation below 65 cms was conducted in arbitrary 10 cm levels, with all soil being screened.

General Analytical Approach

The analysis of the information recovered from our field program was directed at the resolution of questions pertaining to the National

Register significance of the investigated sites. Specifically, our analysis was directed at determining

(1) vertical and horizontal extent of these sites,

(2) the cultural-historical placement of these sites,

(3) the state of preservation of these sites,

(4) the general value of these resources for general archeological/anthropological problem solving,

(5) the importance of these sites for the resolution of currently unresolved research questions, including questions concerning temporal or spatial gaps in our knowledge of the prehistoric past,

(6) the relationship of these sites and their research potentials to the extant regional data base, especially with respect to determining the possible redundancy of the information represented by these sites, and

(7) the specific impact of the proposed project on these resources, and ways in which this impact might be mitigated in the event of a recommendation of National Register Significance.

Questions one through four above will be discussed in the following section on "Study Results". Questions five through seven will be discussed in sections on "National Register Significance" and "Recommendations".

Soils Analyses

The backhoe survey provided an opportunity to describe soil profiles at considerable depths and thereby infer past and present soil-geomorphic processes in the study area. Soil profiles in the backhoe trenches were cleaned with trowels, exposing fresh, vertical soil surfaces. Soil profiles were photographed and described according to procedures outlined in the Soil Survey Manual (Soil Survey Staff 1951). The soil profiles were then sampled by horizon according to methods developed and presented by Cline (1944, 1945). Soil samples were placed in labled plastic bags for transfer to the Kansas State University Soil Testing Laboratory.

Particle size determination of each sample was made by using a Bouyoucos hydrometer, as described by Day (1965). Organic matter content was determined for soils by means of the modified Walkley-Black method (Allison 1965).

Palynological Analyses

A heavy liquid flotation technique was used to separate pollen and other light organics from the bulk of the soil sample sediments. This technique is less severe than more traditional hydrofluoric acid digestion. It is particularly appropriate in alluvial and other clastic sediments where pollen concentration may be low since much larger samples can be used.

Two soil samples were processed from the study area: one from the modern soil, the other from a paleosol with associated archaeological materials. Two kilograms of each of these were processed. First, sodium hexametaphosphate was used to disaggregate the abundant clays in these samples. This was followed by the addition of hydrochloric acid to remove any carbonates present. Large buoyant organics including seeds and charcoal were caught as the sluried samples were poured through a 250-micron sieve. The samples were then centrifuged in one-liter bottles and the acidic liquid discarded. Distilled water washes were used to clean the acids from these sediments before heavy liquid separation was begun.

Zinc chloride was used to separate the organic from the silicate fraction of these samples. A zinc chloride solution with a specific gravity of 1.95 was added to the centrifuged bottles containing the samples. These were stirred to homogeneity and then centrifuged. The pollen and spores having a specific average gravity of 1.86 are held in suspension while the silicates with a specific gravity of greater than 2.0 are lost. The liquid containing the pollen and spores is then diluted to a weight of less than 1.8 and then centrifuged again. The resulting residue was then placed in 50 ml centrifuge tubes and washed with dH_2O. The residue was finally transferred to one dram vials with silicon oil and basic fuchsin, an organic stain.

Permanent glass microscope slides were made from this residue. They were scanned under 200X magnification with up to 1000X magnification used to identify palynomorphs. Standard references (eg. Kapp 1969; Moore and Webb 1978: and Lieux 1980) and modern reference slides aided in the identification of the observed microfossils.

STUDY RESULTS

The results of our evaluations at 23BE1007, 23BE1008, and 23BE1010 are presented below. In this section, the specific discussions of the archaeological manifestations at these sites is prefaced by an examination of the soil geomorphology at 23BE1008 and 23BE1010 including a statement of the significance of buried soils in the study area.

Soil Geomorphology at 23BE1008 and 23BE1010

23BE1008. Dark brown Pippins alluvium was found in backhoe Trench E that was cut perpendicular to the shoreline of the Osage River (Fig. 18). Very little soil development has taken place in this rapidly deposited flood plain (T-0b) sediment. In addition, the upper .5 m of the soil profile has been disturbed by human activity. Road material and/or building rubble occurs at a depth of approximately 37 cm. This layer of poorly sorted, unconsolidated, angular cobbles and stones is approximately 10 cm thick. A rusted iron chain was discovered at a depth of 102 cm. The disturbed modern A horizon overlies a transitional AC horizon located at a depth of 48 cm. The backhoe trench was cut into the upper .7 m of a thick C horizon before encountering groundwater.

A detailed soil description for Trench E is presented in Table 8. The properties of the soil are shown in Table 9.

23BE1010. Yellowish brown Rodgers alluvium was found running parallel to the Osage River, from the river back approximately 100 meters, and extending approximately 1.5 m deep. The upper .8 m of the alluvium is assumed to be the youngest of four subunits of the T-1c4 stratum (Rodgers alluvium)*. A radiocarbon date of 1480 B.P. was determined on charcoal from the base (71 cm) of this alluvial subunit. Immediately below it is a smooth, abrupt contact with a dark brown buried A1 horizon formed on the surface of the next youngest subunit of the T-1c4 stratum. The buried A1 horizon is approximately 22 cm thick and is easily distinguished from the underlying yellowish brown C_b horizon. The base of the C_b horizon provided a date of 2940 B.P. on charcoal extracted from a buried hearth (140 cm).

Detailed soil descriptions for Trenches B and H at site 23BE1010 are presented in Tables 10 and 12. The properties of the soils are shown in Tables 11 and 13.

*Haynes (1981:513) identified four strata (T-1c1 - T-1c4) in the Rodgers alluvium. Stratum T-1c4 is further divided into four subunits and is dated 3600 to 1500 B.P.

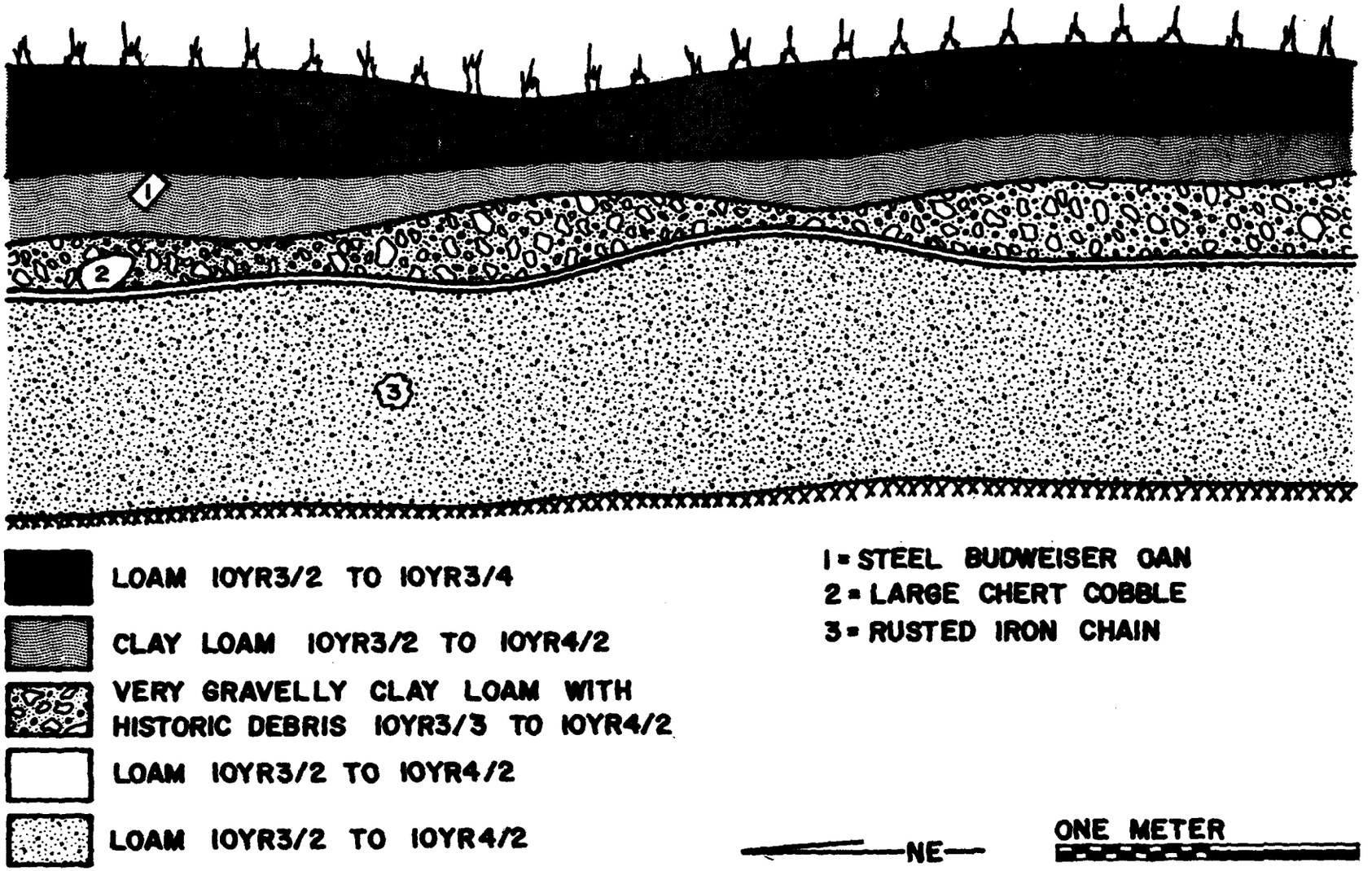


Figure 18. Stratigraphic profile of Trench E at 23BE1008. For detailed soil descriptions, see Tables 8 & 9.

TABLE 8. SOIL DESCRIPTION OF TRENCH E AT 23BE1008.

Site No.: Trench E, 23BE1008

Landform: Flood plain

Parent Material: Alluvium

Slope: 1-2° (1-3%)

Vegetation: Grasses along shoreline; remnants of oak-hickory gallery forest.

Exposure: Backhoe trench

Soil Classification: Cumulic Hapludoll (Mollisol)

Horizon	Depth (cm)	Description
Ap	0-28	Very dark grayish brown (10YR 3/2, moist) to dark yellowish brown (10YR 3/4, dry) loam; weak, fine, granular structure; few fine roots; many worm casts and earthworm channelways; abrupt smooth boundary.
A12	28-37	Very dark grayish brown (10YR 3/2, moist) to dark grayish brown (10YR 4/2, dry); clay loam; medium, subangular blocky structure; few medium roots; few thin clay skins on ped surfaces; abrupt smooth boundary.
A13	37-48	Dark brown (10YR 3/3, moist) to brown (10YR 4/3, dry) very gravelly clay loam; historic building-foundation material; dark red (2.5YR) and yellowish brown (10YR 5/6) coatings on the surfaces of cobbles and stones; few medium roots; abrupt smooth boundary.
AC	48-51	Very dark grayish brown (10YR 3/2, moist) to dark grayish brown (10YR 4/2, dry) loam; very weak, fine subangular blocky structure; yellowish brown (10YR 5/6) mottles; few roots; gradual smooth boundary.
C	51-140	Very dark grayish brown (10YR 3/2, dry) to dark grayish brown loam; massive; firm; dark red (2.5YR) mottles.

TABLE 9

SOIL PROPERTIES,

23BE1008, TRENCH E

Horizon	Depth (cm)	Particle Size Distribution			Organic Matter (%)
		Sand	Silt	Clay	
Ap	0-28	41	37	22	3.0
A12	28-37	26	40	34	2.0
A13	37-48	27	39	34	1.8
AC	48-51	34	43	23	1.3
C	51- 140	32	44	24	1.0

TABLE 10. SOIL DESCRIPTION OF TRENCH B AT 23BE1010

Site No.: Trench B, Site 23BE1010

Landform: River terrace

Parent Material: Alluvium

Slope: 1-2° (1-3%)

Vegetation: Oak-hickory gallery forest

Exposure: Backhoe trench

Soil classification: Cumulic Hapludoll (Mollisol)

Horizon	Depth (cm)	Description
A1	0-10	Very dark grayish brown (10YR 3/2, moist) to grayish brown (10YR 5/2, dry) silty clay loam; weak, fine, granular structure; common fine roots; abrupt smooth boundary,
A12	10-57	Dark yellowish brown (10YR 4/4, moist) to yellowish brown (10YR 5/4, dry) silty clay loam; weak, fine, subangular blocky structure; common fine roots; many worm casts and earthworm channelways; abrupt wavy boundary.
C	57-79	Brown (10YR 5/3, moist) to yellowish brown (10YR 5/4, dry) silty clay loam; weak, fine, subangular blocky structure; few thin clay skins on some ped surfaces; few roots; numerous charcoal particles and chert flakes; abrupt smooth boundary.
$A1_b$	79-114	Dark brown (10YR 3/3, moist) to brown (10YR 5/3, dry) silty clay loam; weak, fine, subangular blocky structure; few thin clay skins; common medium roots; numerous chert flakes; abrupt smooth boundary.
C_b	114-152+	Brown (7.5YR 4/4, moist) to yellowish brown (10YR 5/4, dry) silty clay loam; few roots; massive.

TABLE 11

SOIL PROPERTIES,

23BE1010, TRENCH B

Horizon	Depth (cm)	Particle Size Distribution			Organic Matter (%)
		Sand	Silt	Clay	
A1	0-10	17	48	35	3.2
A12	10-57	17	46	37	2.0
C	57-79	19	50	31	1.1
$A1_b$	79-114	19	50	31	1.3
C_b	114-172+	19	49	32	0.3

TABLE 12. SOIL DESCRIPTION OF TRENCH H AT 23BE1010

Site No.: Trench H, Site 23BE1010

Landform: River Terrace

Parent Material: Alluvium

Slope: 1-2° (1-3%)

Vegetation: Oak-hickory gallery forest

Exposure: Backhoe trench

Soil Classification: Cumulic Hapludoll (Mollisol)

Horizon	Depth (cm)	Description
A1	0-10	Very dark grayish brown (10YR 3/2, moist) to grayish brown (10YR 5/2, dry) silty clay loam; weak, fine granular structure; common fine roots; abrupt smooth boundary.
A12	10-35	Dark yellowish brown (10YR 4/4, moist) to yellowish brown (10YR 5/4, dry) silty clay loam; weak, fine, subangular blocky structure; common large roots; many worm casts and earthworm channelways; abrupt wavy boundary.
C	35-61	Dark yellowish brown (10YR 4/4, moist) to yellowish brown (10YR 5/4, dry) silty clay loam; massive structure; few moderate roots; abrupt smooth boundary.
$A1_b$	61-102	Dark brown (10YR 4/4, moist) to brown (10YR 5/3, dry) clay loam; weak, fine subangular blocky structure; common thin clay skins; few roots; gradual smooth boundary.
C_b	102-139+	Dark yellowish brown (10YR 4/4, moist) to yellowish brown (10YR 5/4, dry) clay loam; yellowish brown mottles (10YR 5/6); common thin clay skins; massive.

TABLE 13

SOIL PROPERTIES,

23BE1010, TRENCH H

Horizon	Depth (cm)	Particle Size Distribution			Organic Matter (%)
		Sand	Silt	Clay	
A1	0-35	19	46	35	2.5
C	35-61	19	50	31	0.8
$A1_b$	61-102	20	48	32	1.1
C_b	102-139+	20	48	32	0.7

Significance of Buried Soils in the Study Area. The discovery of a buried paleosol in late-Holocene Rodgers alluvium at site 23BE1010 provides valuable new information for understanding the evolution of the Osage Basin landscape. Previous studies by Haynes (1976, 1977, 1981), Johnson (1977) and Johnson et al. (1981) failed to identify even weakly developed intercalated soils (conceptually expected in episodically aggrading alluvium) in the T-1c4 (3600-1500 B.P.) deposit of the Rodgers terrace. Johnson et al. (1981:659) suggests that post-burial blurring of pre-existent soils has destroyed paleopedologic evidence in the late-Holocene Rodgers alluvium. The presence of a buried soil at site 23BE1010 suggests that favorable conditions for post-burial preservation were very localized in the Osage Basin.

Radiocarbon dates from charcoal found in cultural horizons above and below the paloesol suggest that the buried soil formed between ca. 3000 and 1500 B.P. The $A1_b$ horizon, which is approximately 35 cm thick, accumulated during this 1,500 year interval at an average rate of less than 1.0 cm/yr. Extremely slow, but constant aggradation may have inhibited the development of strong soil horizons, and thus the paleosol exhibits a poorly developed AC profile. Modern pedogenic processes may have also altered the paleosol's original horizons.

A buried soil within an alluvial sequence is generally interpreted as indicating a significant reduction or cessation of alluviation followed by or concomitant with an episode of soil formation (Johnson et al. 1981:652). Buried A1 horizons represent previous land surfaces which were exposed for sufficient periods of time to develop recognizable soil profile characteristics. Thus, they represent stable land surfaces. Such a period of "stability" is usually interpreted to be casually related to climatic or environmental stability (Johnson et al. 1981:652).

The presence of a buried A1 horizon at site 23BE1010 suggests that there was a period of climatic stability in the Truman Reservoir area during the late Holocene. Since most alluvial deposition appears to be episodic through time, it seems reasonable to expect that discrete incipient soils, such as the paleosol in the study area, should have developed. Furthermore, the period of stability (ca. 3000 - 1500 B.P.) represented by the paleosol should have been regional in extent.

Soil-geomorphic studies in the Pomme de Terre River Valley and elsewhere suggest some regional patterns. For example, Haynes (1981: 513) notes that the lower Pomme de Terre River experienced quasi-stability between 4000 and 2000 B.P. Radiocarbon dates from Late Archaic occupations preserved in a buried paleosol suggest the upper Walnut River in south-central Kansas was slowly aggrading between 4000 and 2000 B.P. (Artz 1980). The flood plain of the Big Blue River in north-central Kansas was also relatively stable between 4000 and 2000 B.P. (Schmits 1980).

The recognized presence of Rodgers alluvium, or Rodgers-like alluvium, at a number of sites in western Missouri and eastern Kansas, suggests that the paleoenvironmental processes that were operating between about 11,000 to 1,000 years ago were generally synchronous. Furthermore, the occurrence of a buried paleosol in late-Holocene Rodgers alluvium within the Osage Basin supports evidence for widespread environmental stability between 4000 and 2000 B.P.

The Gaylord Pasture Site (23BE1007)

Our surface and subsurface examinations at 23BE1007 revealed no evidence of an archeological site. The only lithic material observed at and in the vicinity of 23BE1007 were what appeared to be naturally fractured chert cobbles.

This lithic material was small sized and of low density south of the intermittent tributary located north of 23BE1007 (Fig. 9), and of larger size and higher density north of this tributary. This material appears to derive from the slopes of the relocated Missouri Route 7, which are covered with chert gravels. The density of this material decreases to the south of Route 7, essentially stopping at the tributary. South of the tributary, density is very low, and was probably transported across the tributary on animal hooves and farm machinery.

The relationship of this material to that collected by SMSU is uncertain. None of the lithic material we observed was definitely modified by humans. We feel it is possible but unlikely that the definite cultural artifacts collected by SMSU were brought in with the non-cultural fill for Route 7. More likely, these materials represent evidence of a very low density occupation restricted to the modern soil horizon.

The surface soil zones in the vicinity of 23BE1007 have been extensively disturbed by modern agricultural uses. As a result, the cultural deposits at this site, which appear to be restricted to these surface soils, have certainly been disturbed. While agricultural disturbance does not necessarily destroy the value of a site, it is a negative factor which must be considered in any evaluation of significance.

The Kowertz Site (23BE1008)

Our subsurface evaluations of 23BE1008 revealed that the prehistoric materials at this site had been redeposited at this location during the historic period. This conclusion was easily reached by the examination of the stratigraphic profiles in the five backhoe cuts at this site. These profiles revealed an intermixture of lithic debris, chert cobbles and brick, iron and historic ceramics. This zone of mixed rubble occurs between about 35 and 50 cms below the modern surface. Of significance, a length of iron chain was discovered *in situ* at 102 cms below surface in the C horizon

below the horizon of mixed debris.

The horizon of mixed debris at this site -- unquestionably of historic origins -- is the only possible origin of any prehistoric materials observed at this location. Considering the fact that this mixed horizon was deposited during the historic period (probably during the first half of this century), 23BE1008 is more appropriately defined as a historic period resource.

The Lotterer Site (23BE1010)

The general results of our field program can best be discussed under the heading Horizontal Extent; Vertical Characteristics; Features 1 and 2; Age and Cultural Associations; Site Function; Preservation; Results of Palynological Analysis; and Relationship to the Proposed Project.

Horizontal Extent. The Horizontal extent of 23BE1010 was determined by considering (1) the distribution of prehistoric artifacts along the shore of the Lake of the Ozarks, (2) the presence and absence of prehistoric materials observed in the backhoe trenches, and (3) the location of landscape features beyond which the site would not normally be expected to extend. Based on these factors, this site is estimated to cover an area approximately 8,756 square meters. Its maximum north-south axis measures about 100 meters with its maximum east-west axis measuring 130 meters. It extends for approximately 95 meters along the shore of the Lake of the Ozarks. It is bounded on the east by the Lake of the Ozarks, on the north by an unnamed intermittent tributary draining a cut-off meander lake, on the west by a cut-off meander lake, and on the south by a swamp. This horizontal distribution appears to be characteristic of the entire occupational history of 23BE1010.

The hearth (Feature 1) was located 75 meters from the shore of the Lake of the Ozarks. The burned house (Feature 2) was located 32 meters from the shore and is bisected by the proposed project center-line. Materials recovered from the backhoe trenches indicate the highest artifact density portion of the site lies within 20 meters of the shore of the Lake of the Ozarks (Table 14).

Vertical Characteristics. In general, the backhoe trenches demonstrate that cultural material at 23BE1010 does not extend below a depth of two meters. Specific information on the vertical distribution of cultural material was obtained from Test Unit 1 (Fig. 19). This test unit extended from 65 cms to 180 cms below the surface -- the zone identified as culture bearing from the backhoe trenches. Excavated in arbitrary 10 cms levels, this unit revealed artifact density peaks at Level 4 (100-110 cms) and Level 8 (140-150 cms) (Table 15). Of importance, the Level 4 peak correlates with a paleosol extending from 79 to 114 cms below the modern surface in this unit (Fig. 19). The Level 8 peak is substantially below this paleosol.

Table 14. Frequency of cultural materials recovered from backhoe trenches at 23BE1010.

TRENCH	NUMBER OF ARTIFACTS	PERCENT
A	60	20.27
B	38	12.83
C	8	2.70
D	4	1.35
E	12	4.05
F	6	2.02
G	2	.67
H	123 (Feature #1)	41.55
I	0	0.0
J	2	.67
AA	28 (Feature #2)	9.45
BB	0	0.0
AAA	13	4.39
BBB	0	0.0
TOTAL	296	99.95

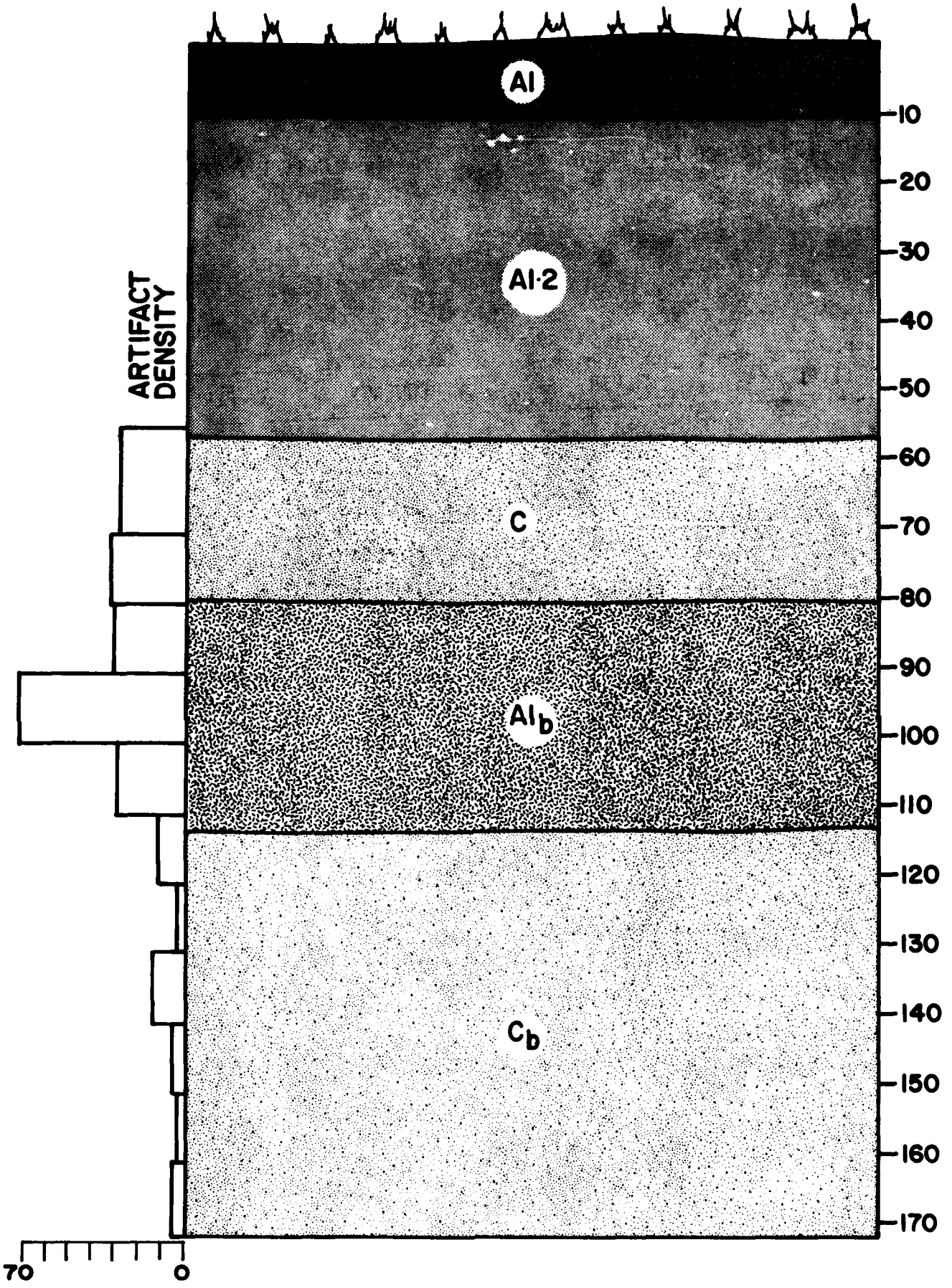


Figure 19. Idealized profile of Test Unit 1 at 23BE1010 showing soil horizons and frequency of artifacts in Levels 1 through 11. For detailed soil descriptions, see Tables 10 and 11.

Table 15. Frequency of total artifacts from Test Unit 1 at 23BE1010.

LEVEL	DEPTH	FREQUENCY	PERCENT
1	65- 80 cms.	28	12.72
2	80- 90	31	14.09
3	90-100	30	13.63
4	100-110	71	32.27
5	110-120	29	13.18
6	120-130	11	5.00
7	130-140	1	.45
8	140-150	12	5.45
9	150-160	3	1.36
10	160-170	1	.45
11	170-180	3	1.36
TOTAL		220	99.96

Features 1 and 2 are relatively informative on the vertical characteristics of 23BE1010. Feature 1 (hearth) was discovered 143 cms below the surface with the Feature 2 (house) being found at a depth of 71 cms below the modern surface. This places Feature 1 approximately 15 cms below the paleosol and Feature 2 somewhere above the paleosol. The exact relationship of Feature 2 to the paleosol could not be determined because excavation of Trench AA was discontinued upon discovery of this feature.

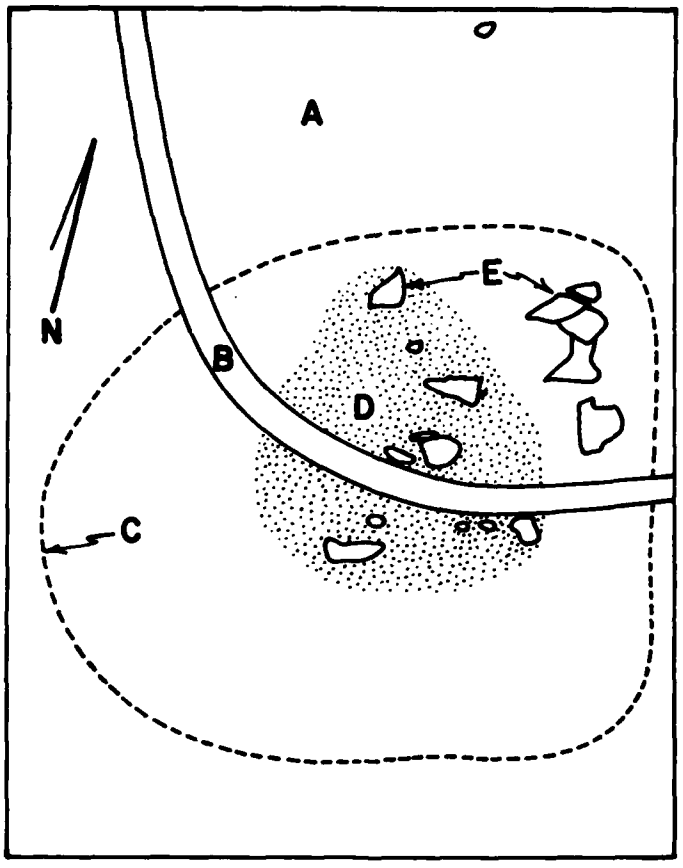
Of general importance is that we have (1) defined artifact peaks at 100-110 cms and 140-150 cms below the surface in Test Unit 1, and (2) determined that intact cultural features exist at least between 71 cms (in Trench AA) and 143 cms (in Trench H) below the modern ground surface. Although we cannot at this point be certain, Feature 1 probably correlates with the Unit 1 artifact peak at 140-150 cms and Feature 2 with the Unit 1 artifact peak at 100-110 cms.

Features 1 and 2. Feature 1 was encountered in Trench H at a depth below surface of 140 cms in the C_b soil horizon. This feature was located approximately 38 cms below the base of the $A1_b$ paleosol at this point. This feature is interpreted as a hearth, and was characterized by a dark stain containing concentrations of charcoal and burned stones (Fig. 20). A radiocarbon date (Beta - 4257) from this feature yielded a date of 2940±90 B.P. (990 B.C.). This would place this feature in the first part of the early Woodland Period (Chapman 1975).

Feature 2 was encountered in Trench AA at a depth below surface of 71 cms. This would place this feature immediately above the $A1_b$ paleosol. This feature was observed as a dark stain containing a large amount of charcoal and burned daub (Fig. 21), and is interpreted as the remains of a burned house. Charcoal from this feature was dated at 1480±70 B.P. (A.D. 470) (Beta - 4258), placing this feature during the initial years of the Late Woodland Period (Chapman 1975).

Considering (1) the area extent of this site (8,756 square meters), (2) the surface area examined for subsurface features (66.5 square meters), and (3) the number of features discovered (one per 33.25 square meters), we can estimate that 23BE1010 contains approximately 263 major features such as hearths, architectural features, storage pits, and burials. This, of course, assumes a fairly even distribution of features within this site.

Age and Cultural Association. Purrington (1981:73) concludes that the occupation at 23BE1010 was largely if not exclusively Middle to Late Woodland. An analysis of projectile points and diagnostic projectile point fragments discovered during our project tends to confirm this conclusion. The eight projectile points, projectile point fragments, and projectile point preforms that could be identified included two Rice Side Notched, one small side notched point, one Marcos, one Scallorn, two Snyders, and one Snyder preform (Perino 1968; Bell 1958, 1960; Chapman 1975) (see Fig. 22). These projectile points occur exclusively during the Woodland or have ranges that overlap the Woodland Period (Table 16).



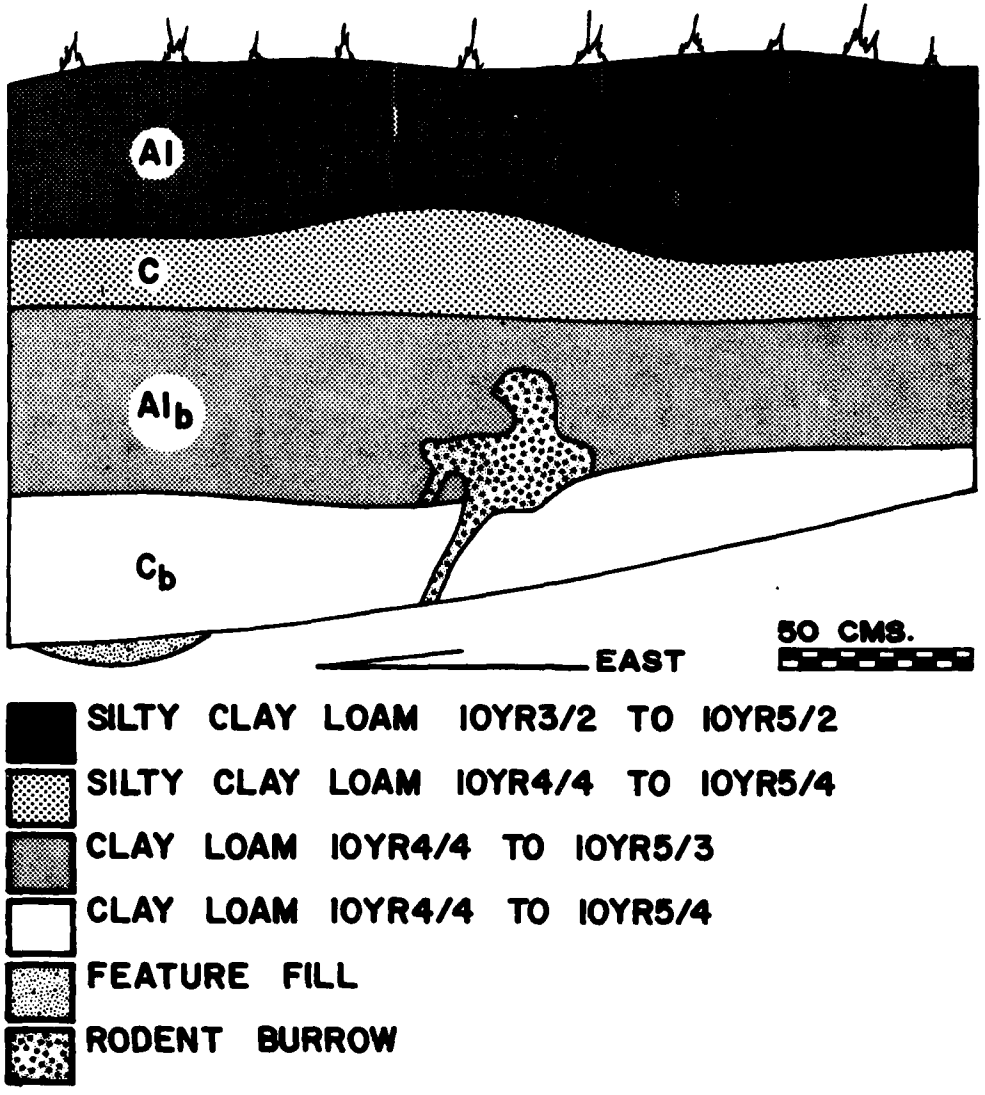


Figure 20. Plan view of Feature 1 at 23BE1010 (left) and profile of Trench H showing stratigraphic location of Feature 1. For detailed soil description of Trench H, refer to Tables 12 & 13.

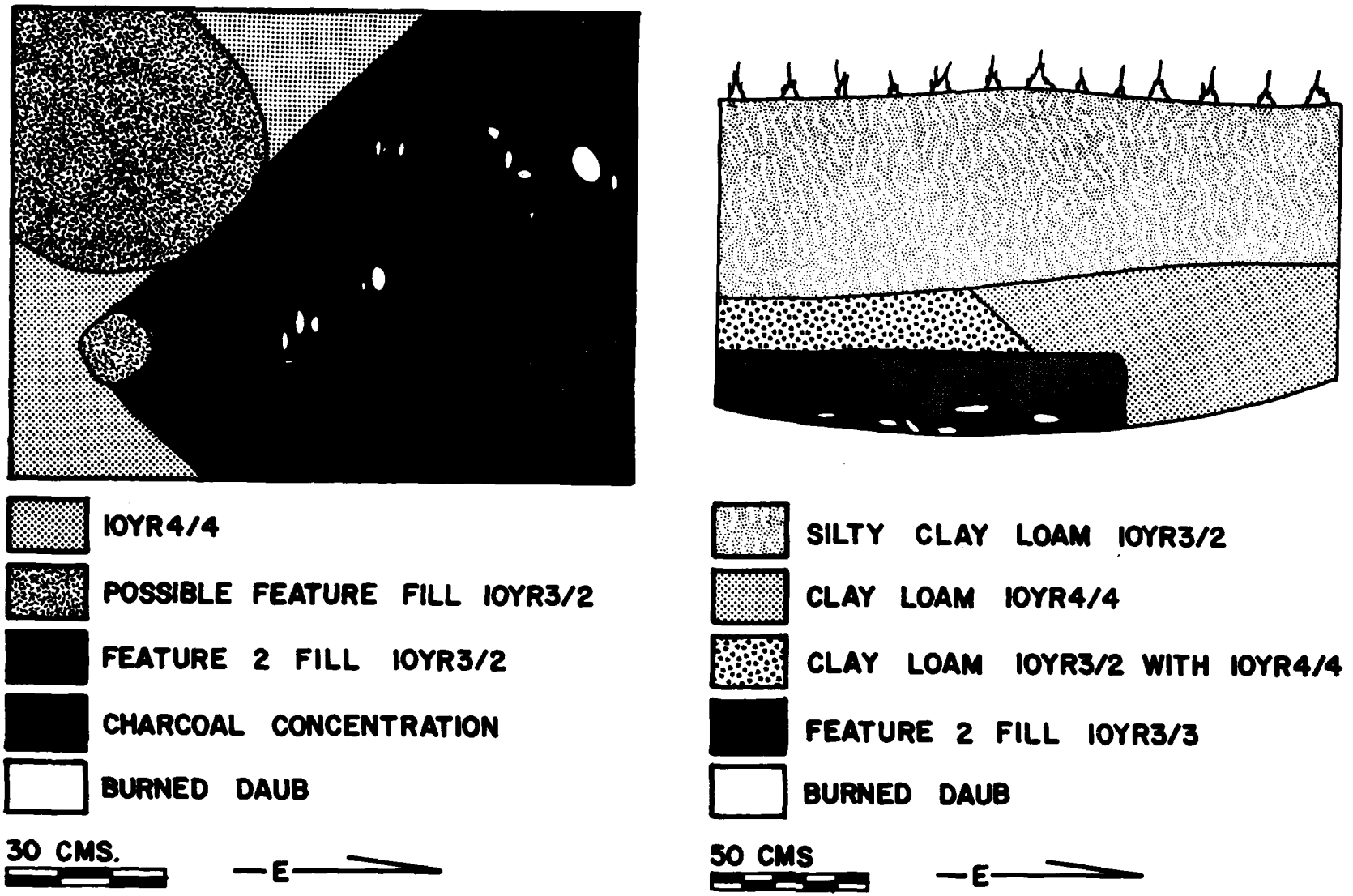


Figure 21. Plan view of Feature 2 at 23BE1010 (left) and profile of Trench AA showing the stratigraphic position of this feature.

TABLE 16. PROJECTILE POINTS FROM 23BE1010.

TYPE	CATALOG NO.	PROVENIENCE	AFFILIATION
Snyder preform	23BE1010-2-79-1	Trench A	Middle Woodland/ Hopewell
Snyder	23BE1010-19-56-1	Test Unit 1, Level 1	Middle Woodland/ Hopewell
Snyder	23BE1010-3-100-1	Trench B	Middle Woodland/ Hopewell
Scallorn	23BE1010-1-57-1	Shoreline	Late Woodland
Rice Side Notched	23BE1010-1-58-1	Shoreline	Late Woodland
Rice Side Notched	23BE1010-1-59-1	Shoreline	Late Woodland
Marcos (?)	23BE1010-14-94-1	Trench AAA	Woodland
Small Side Notched	23BE1010-1-20-1	Shoreline	Woodland ?

The only projectile point found in situ was a Snyder point recovered from Level 1 (65-80 cms) of Unit 1. Unfortunately, this point was discovered in a tree stain and its original stratigraphic placement cannot be certain. Snyder points are generally associated with the Middle Woodland Period.

Radiocarbon dates from Features 1 and 2 are extremely informative with respect to the age of 23BE1010. The Feature 1 hearth was dated at 2940± 90 B.P. (990 B.C.) (Beta - 4257). This date, from the strata below the paleosol, suggests an Early Woodland Period occupation. Feature 2, preliminarily interpreted as a burned wattle and daub house, has been dated at 1480±70 B.P. (A.D. 470) (Beta - 4258). This date, from above the paleosol, suggests an early Late Woodland Period occupation. Clearly, this identified the paleosol as a Woodland phenomena, and suggests that the Woodland Period occupation at this site may be separated stratigraphically. The importance of this will be introduced under our discussion of site significance.

Site Function. With respect to the function of 23BE1010, Purrington (1981:84) states,

> The Lotterer site, 23BE1010, has a very high activity index (0.9697), a high artifact density, a midden, and a location on relatively high ground beside the Osage River. Both extractive and domestic activities are represented in the artifact assemblage. The site is interpreted as a multiple activity river-edge site which was intensively occupied possibly as a base settlement or even on a year-round basis.

Purrington's activity index was derived by dividing the total number of artifact use classes present at 23BE1010 by 33, the total number of use classes at all known sites in the project area (see Purrington 1981:75). Our examination of this index for Test Unit 1 -- the only controlled excavations conducted in the area -- revealed an activity index of .3939, considerably lower than Purrington's index of .9697. The difference is obviously one of sampling error, with a wider variety of artifact types being observed on the shore (Table 17).

Rather than refuting a high activity index for this site, this information indicates, in a preliminary way, a differential distribution of activity areas at 23BE1010. That is, if activities were not distributed differentially over the site, the activity index for any part of the site would be expected to mirror that for a generalized collection from the site. This is quite the opposite from what we see at 23BE1010. Such a differential distribution of activities is, of course, what is to be expected from a well preserved site.

TABLE 17

ACTIVITY INDEXES FOR EACH LEVEL OF TEST UNIT 1 AT 23BE1010
(Following Purrington 1981)

Level 1 (70-80 cm)	0.1212
Level 2 (80-90 cm)	0.2121
Level 3 (90-100 cm)	0.2121
Level 4 (100-110 cm)	0.3636
Level 5 (110-120 cm)	0.2424
Level 6 (120-130 cm)	0.1515
Level 7 (130-140 cm)	0.0303
Level 8 (140-150 cm)	0.0909
Level 9 (150-160 cm)	0.0303
Level 10 (160-170 cm)	0
Level 11 (170-180 cm)	0.0303
TOTAL (Levels 1 - 11)	0.3939

Of interest in the computation of an activity index based on Test Unit 1 at 23BE1010 is a consideration of changes in this index through time. This change through time can be examined by examining the activity index as computed for each of 11 levels of Test Unit 1. What this reveals is a gradual increase in the index through time up to Level 4, after which a slight decline begins. Level 4 is directly associated with the paleosol at this site, which is definitely Woodland and probably Middle Woodland. An increase in activity diversity up to the Middle Woodland followed by a decline during the Late Woodland is consistent with general cultural-historical reconstructions for this area.

Preservation. Except for shoreline erosion along the Lake of the Ozarks and except for disturbances to 23BE1010 from our 14 backhoe tests, the Lotterer Site appears to be in excellent condition. To a very large extent, this is the result of the burial of cultural deposits under at least 50 cms of alluvium. Except for roots and root stains, we observed no evidence of disturbance to the prehistoric components of 23BE1010. The presence of a well defined paleosol and two well preserved cultural features at this site leads us to conclude that 23BE1010 represents an unusually well preserved site.

Results of Palynological Analysis. The palynological-paleoenvironmental data available from the archaeological-paleosol level are very limited. Pollen preservation is poor. Pollen grains were all but absent from the one paleosol sample processed. Curiously, spores of mosses and primitive vascular plants were well preserved and abundant in this same sample. This does not appear to be an artifact of the extraction process for several attempts with varied densities of heavy liquid produced the same assemblage. It is instead a problem of differential preservation of the pollen and spores. Many variables contribute to this poorly understood process of differential palynomorph destruction (e.g. Hall, 1981).

The most common palynomorphs (comprising 48 percent of the paleosol assemblage) are spores of the Ophioglossaceae family. The rattlesnake fern (Botrychium virginianum), which inhabits humid, rich woods and thickets of most of central and eastern North America, is typical of this family. Similar humid site indicators are also present in the assemblage. Spores of clubmosses (Lycopodiaceae) and the true mosses and related plants (the Bryophytes) contribute an additional 6 percent of the total palynological sum. Other common palynomorphs including algal cysts and fungi imperfecti were also abundant and well preserved. The distribution and environmental affiliation of these palynomorphs are not yet documented.

Pollen, on the other hand, represented only 5 percent of the total palynomorphs counted. Most were so chemically corroded and mechanically damaged as to preclude identification. A single grain of sweet gum (Liquidambar sp.) was identifiable. This species is common in rich, moist bottomlands and swampy sites of the southeast United States. It is intolerant of dry and/or cold conditions. The study area is approximately the northwestern limits of the natural range of this tree today.

The modern soil sample taken at the site contrasts the pollen-poor paleosol sample discussed above. The modern sample contains a variety of pollen types, which represent the regional oak-hickory forest. Included are examples of hickory (Carya sp.), oak (Quercus sp.), beech (Fagus sp.), ash (Fraxinus sp.), and pine (Pinus sp.). The herbaceous assemblage is dominated by ragweed (Ambrosia type) pollen. Grass (Gramineae) and Cheno-Am type (Chenopodiaceae and Amaranthaceae, i.e., pigweed and lamb's quarters) pollen are also common.

Many spores are also present, including an Ophioglossaceae type. It is, however, rare compared to the abundance recovered in the paleosol. Similar moss spores and algal cysts were also recovered from the modern soil sample.

Another line of botanical evidence which exhibits potential for this site is seeds. As a by-product of the palynomorph extraction procedure on the paleosol, a number of carbonized seeds were floated out along with rootlets, charcoal, and other light organic debris. Two taxa of seeds are apparently represented. Neither has yet been identified. These seeds were obtained from a relatively small quantity of soil (about 2 Kg). Larger samples may produce a greater variety of these macrofossils as well as radiometrically datable charcoal.

In conclusion, the paleosol level apparently represents a very wet site, wetter than the modern soil above it. A regional vegetation record is, however, absent. The single grain of Liquidambar pollen suggests that the environment was at least not cooler or drier than at present. Preservation of palynomorphs is unfortunately marginal. Other sampling localities with slightly different depositional environments could well produce more complete and representative assemblages of pollen, i.e., based upon past experience, a resampling of the buried paleosol in an adjacent area could easily yield an interpretable pollen assemblage.

Relationship to the Proposed Project. As currently planned, site 23BE1010 will suffer at least two direct impacts from the proposed levee project. The first will come from construction of the levee itself. The levee centerline passes directly through the center of the site (see Fig. 16) and bisects Feature 2 which is located in Trench AA. Along the centerline, cultural materials occur within 70 cms of the modern surface. The construction right-of-way for this levee includes approximately 5,619 square meters or roughly 64 percent of this site.

The second direct impact will result from changes in the shoreline through increased erosion and/or the installation of riprap as shoreline protection. Either will, to some degree, impact what appears to be the portion of 23BE1010 with the highest artifact density, which is that area within 20 meters of the shore of the Lake of the Ozarks.

NATIONAL REGISTER SIGNIFICANCE

A determination of the potential National Register significance of 23BE1007, 23BE1008, and 23BE1010 is, of course, the focus of this report. The following recommendations of significance are designed as the end result of a consideration of the relative research merits of each site and the merits of preservation of each site.

The Gaylord Pasture Site (23BE1007)

The Gaylord Pasture Site is not recommended as a site that should be included on the National Register of Historic Places. This recommendation is based on several considerations:

(1) As reported by Purrington (1981), the site is of extremely low density.

(2) The site area has been extensively disturbed by agricultural uses of the area.

(3) It is possible, but not easily demonstrable; that the cultural material reported at 23BE1007 was brought in with fill for Missouri Route 7.*

(4) There is no evidence of buried cultural deposits at this location.

(5) As exemplified by this resurvey and testing project, additional research efforts at this site are not expected to result in a sufficient amount of new information to justify such research.

Based on these considerations, and based on the recordation of basic site location and size information and the recovery of a sample of artifacts from this site by SMSU in 1981, it is our opinion that loss of this site is acceptable.

The Kowertz Site (23BE1008)

The Kowertz Site is not recommended as a site that should be included on the National Register of Historic Places. This recommendation is based on our conclusion that 23BE1008 represents an "imported" site devoid of all

*Recovery of definite cultural materials from definite *in situ* road fill would result in a strong but not infallible statement of such a relationship between Route 7 and 23BE1007.

original context. This being the case, 23BE1008 has no research potential beyond a study of the processes which resulted in the redeposition of a mixture of prehistoric and historic materials at this site sometime during the historic period. The investigation of these historic processes is not felt to be of sufficient importance to warrant any further consideration of 23BE1008 as a site of National Register significance.

The Lotterer Site (23BE1010)

The Lotterer Site is recommended as a site that should be nominated to the National Register of Historic Places. This recommendation is based on our determination that the Lotterer Site represents an exceptionally well preserved site and that it represents a source of quality, non-redundant information important for the proper understanding of the prehistoric past in this region.

Our conclusion that the Lotterer Site represents an exceptionally well preserved cultural resource is based on the following points:

(1) The site is buried under at least .50 m of alluvium, shielding the site from historic period disturbances.

(2) Two intact cultural features were discovered within the buried cultural deposits at this site.

(3) The soil profile of this site reveals it is stratified into several distinct strata. Of significance, one of these strata is a well developed paleosol which has been closely dated as having developed during the Woodland Period.

(4) The vertical artifact frequency profile and activity index profiles show distinct patterns through time with peaks at the level of the paleosol. If this paleosol is interpreted as Middle Woodland -- which the radiocarbon dates suggests -- this temporal pattern reflects what we would expect for the periods leading up to and following the Middle Woodland.

(5) The low activity index of the Test Unit 1 material indicates, when compared to the shoreline collection, that there is also horizontal patterning of activities at this site. This horizontal pattern is indicative of a well preserved site.

These five points indicate that 23BE1010 holds the type of information necessary for general anthropological problem solving (Glassow 1977).

We can identify this site as a source of non-redundant information by looking at previous research on open Woodland Period sites in the region. As was discussed in the section on previous research, only five other sites with buried Woodland components are known for the Harry S. Truman area. Considering the poor understanding of Woodland Period settlement in this area, this represents a relatively small known data base.

What is particularly significant about 23BE1010 is that it appears to be a large permanent village during Middle and Late Woodland times. The information from this site will therefore be important for examining Woodland village structure, the role of the village in the regional settlement pattern, and changes in village structure during the Woodland Period. Of special interest is that 23BE1010 appears to contain information which will be useful in documenting and understanding the postulated cultural disintegration characteristic of the transition from Middle to Late Woodland times.

MITIGATION RECOMMENDATIONS

Our consideration of the significance of sites 23BE1007, 23BE1008, and 23BE1010 has led us to conclude that 23BE1007 and 23BE1008 should not be nominated to the National Register of Historic Places. Therefore, the construction projects proposed by the Corps of Engineers are considered to have no adverse impact on these cultural resources. It is our general recommendation that the proposed project be allowed to proceed without any further consideration of either 23BE1007 or 23BE1008.

It is our conclusion, however, that 23BE1010 possesses those qualities which make it of sufficient significance for inclusion on the National Register. As a result, it is our recommendation that the Corps of Engineers develop measures to insure the proposed project does not destroy or degrade this important cultural resource. Based on our understanding of 23BE1010 and the proposed levee project, we have developed a series of alternatives to mitigate any information loss as a result of the proposed project.

Project Impacts on 23BE1010

As currently planned, the construction right-of-way at 23BE1010 includes 5,619 square meters (64 percent) of this site. Construction activities in the vicinity of 23BE1010 as a result of the proposed levee project will include

(1) Impacts associated with the construction of an earthen fill levee across the site. This levee is proposed to be approximately 60 feet (18.28 m) wide and 6 feet (1.82 m) high. This levee is proposed as earth fill with stone protection on the riverside slopes. The levee foundation will be the existing soil horizons, with disturbance of these soil horizons limited to the top 2 feet (60 cm), (A1 and Ac horizons). Settlement due to the weight of this earth fill levee is anticipated to be negligible, probably less than 1 to 2 inches (2.54 to 5.08 cm). 1,768 square meters (20 percent) of the surface of 23BE1010 will be covered by the levee.

(2) Stabilization of the lakeshore in the vicinity of 23BE1010. This will be necessary to prevent the possible erosion of the portion of 23BE1010 located between the levee and the Lake of the Ozarks. Stabilization may require cutting a stable slope along the shore and possibly installing stone protection (riprap) along the shoreline. The exact percentage of 23BE1010 that would be affected by this action is uncertain, but will

probably not extend more than 10 meters inland. If impact does extend 10 meters inland, this would affect approximately 1,000 square meters (11 percent) of the site.

As described, activities associated with construction of the levee should not impact the buried cultural deposits at 23BE1010. This conclusion is, however, based on statements by Corps of Engineers personnel that construction will not disturb this site below a maximum of two feet (60 cms). If any disturbance below two feet (60 cms) is planned (or possible), 23BE1010 will be seriously impacted.

Besides the effects from construction, another potential impact that must be considered concerns the availability of this site for future research. If burial of 23BE1010 results in the effectual removal of this site from the pool of significant sites available for future research, this might constitute an adverse impact.

Based on our current understanding of construction plans and needs*, however, the only imminent and immediate impact to 23BE1010 appears to be associated with the proposed shoreline stabilization. In that this will affect a relatively large portion of the highest density part of this site, stabilization which results in any site loss will result in a serious impact to site integrity. If stabilization cannot be accomplished by a fill rather than a cut process, mitigation of data loss by intensive data recovery is recommended.

Since the area that might be affected by shoreline stabilization cannot be precisely determined at this point, specific data recovery recommendations are not possible. We do, however, recommend data recovery along the shore or elsewhere at 23BE1010 include the following specifications:

(1) removal of overburden (A1 and AC horizons) mechanically,

(2) excavation of approximately 150 cms of cultural fill (in horizons C, $A1_b$ and C_b) in arbitrary 10 cm levels or by natural level where possible,

(3) 100 percent recovery of artifacts using water screens and ¼" mesh, with a sample being processed through smaller mesh,

(4) radiocarbon program of sufficient scale to deal with predicted number of features,

(5) excavation rate sufficient to allow proper recordation of features,

*Based on discussions with the Kansas City District, Corps of Engineers on March 29, 1982.

(6) expanded soils and palynological research, including radiocarbon dating of humus in paleosol ($A1_b$ horizon), and

(7) after area has been sampled by controlled hand excavation, entire cultural horizon should be mechanically stripped in approximately 10 cm levels, with all exposed features being hand excavated and recorded.

These general techniques are what is minimally necessary to provide for proper data recovery at 23BE1010.

GLOSSARY

ABRADER - A stone used to sharpen other instruments by wearing away the dulled edge or surface.

AGGRADATION - To fill with sediment.

ALFISOLS - Mineral soils that have no epipedon, or oxic, or spodic horizon but do have an argillic or natric horizon which is at least 35 percent base saturated.

ALLUVIAL - Pertaining to or composed of earth deposited by water.

ANVIL STONE - The stationary object against which an objective piece is projected with sufficient force to accomplish fracturing.

ARTIFACT - Objects devised, produced or modified by man, modification may be either by intent or by function.

AWL - A pointed instrument for making small holes.

B.P. - Abreviation for "before present'. For comparability, the present is arbitrarily set at A.D. 1950.

BARRENS - A sparsely timbered open woodland.

BIFACE - Artifact bearing flake scars on both faces.

BOTTOMLAND - Young alluvium deposited by present stream action (the present flood plain).

BURLINGTON CHERT - A white to light grey and buff Mississippian chert which is very coarse grained with an abundance of crinoids present.

BURIED PALEOSOL - Includes soils that were formed on a landscape during the past, and were buried by sedimentation subsequent to pedogenesis.

CELT - An ungrooved axe used primarily for wood-working.

CHERT - A fine-grained siliceous rock.

CHOPPER - Heavy core tool presumed to be used for chopping. May by uniface or biface.

CHOUTEAU CHERT - A fine grained, fossiliferous chert with a waxy lustre. The cortex is white with a light and dark grey, blue, black or light brown mottled core. Mottling is splotchy.

CLAY - As a separate, the mineral soil particles less than 0.002 millimeter in diameter. As a textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

COLLUVIUM - Is that part of the soil on the earth's surface which consists of heterogeneous materials of any particle size which accumulates on the lower parts or the base of slopes.

CROSS-HATCHING - Ceramic decoration with incised or impressed crossed lines.

DEBITAGE - Residual lithic material resulting from tool manufacture.

DEGRADATION - To remove sediment.

DENTATE - Having a notched, tooth-like edge.

DISSECTED - Cut into ridges, as a plateau.

ECOTONE - A boundary between two plant communities, where the species of one community are intermingled with those of another.

EPIPEDON HORIZON - A diagnostic surface horizon which includes the upper part of the soil that is darkened by organic matter or the upper eluvial horizons of both.

FLOOD PLAIN - A nearly level alluvial plain that borders a stream and is subject to flooding unless protected artificially.

FLUTED PROJECTILE POINT - A projectile point bearing one or two longitudinal channel flake scars from base toward the tip on one or both faces of the artifact.

FORB - A weed or other herb that is not grass.

FRAGIPAN - A subsoil layer that has a high bulk density, is brittle when moist, and is very hard when dry. They do not soften on wetting, but can be broken in the hands. Air-dry peds slake in water.

GASCONADE CHERT - A blue, grey and white banded Ordovician chert which sometimes contains elongated, irregular, bean-shaped oolites. This poor quality grainy, amorphous chert is very vuggy and drusy with quartzose inclusions.

GRAVEL - Rounded or angular fragments of rock up to 3 inches (2 millimeters to 7.5 centimeters) in diameter. An individual piece is a pebble.

HAFT - A handle.

HOLOCENE - Designates the Recent epoch in geologic time. The Holocene started with the close of the Pleistocene (10,000 B.P.).

HORTICULTURE - The cultivation of a garden. The art or science of growing garden vegetables.

ILLUVIAL HORIZON - The layer of accumulation.

INCEPTISOLS - Soils with one or more diagnostic horizons that are thought to form rather quickly and that do not represent significant illuviation or eluviation or extreme weathering.

JEFFERSON CITY CHERT - This smooth, fine grained, high quality Ordovician chert comes in three distinct varieties, none of which is fossiliferous, except for an occasional spine.

1. Oolitic - which contains small, spherical grains 0.5-0.7 mm which may be sand-centered, concentrically banded or unstructured.
2. Banded - chert is usually white with alternating bands of blue, black. grey, or purple.
3. Mottled - contains any combination of the above colors in a pattern of streaks, swirls or disturbed bands.

LANCEOLATE - A long slender chipped stone point or knife pointed at one or both ends.

LITHIC - Of or pertaining to stone.

LOAM - Soil material that is 7 to 27 pecent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

LOESS - Fine grained material, predominantly of silt-sized particles, deposited by wind.

MANO - The upper stone used on a metate to grind grain. Also known as a handstone. The mano is only moved back and forth.

MISSISSIPPIAN - A geologic period that lasted from about 345 to 325 million years B.P.

MOLLISOL - In contemporary soil layers, the actual zone of freeze and thaw. Soils characterized by a thick dark mineral surface horizon.

ORDOVICIAN - A geologic period that lasted from about 500 to 435 million years B.P.

OXIC HORIZON - A highly weathered diagnostic subsurface horizon from which most of the combined silica has been removed leaving a mixture dominated by hydrous oxide clays with some 1:1 type silicate minerals and quartz present.

PALEOENVIRONMENT - The ancient aggregate of external circumstances, conditions, and things that affect the existence and development of an individual organism or group.

PALEOPEDOLOGY - The science that treats the origin, nature, properties and classification of ancient soils.

PALEOSOL - A soil which has formed on a landscape of the past, usually under conditions different from the present.

PALYNOLOGY - The branch of science dealing with pollen and spores.

PENNSYLVANIAN - A geologic period that lasted from about 325 to 280 million years B.P.

PIERSON CHERT - A very coarse grained, fossiliferous chert with a multitude of large crinoids. It is distinguishable from the Chouteau chert it resembles by its purplish tint.

PLEISTOCENE - A geologic epoch that lasted from approximately 2.5 million years B.P. to 10,000 years B.P. This time period is commonly referred to as the Ice Age.

POORLY-DRAINED SOIL - Water is removed so slowly that either the soil is periodically saturated or the upper 10 inches

has the mottles or dull colors related to wetness.

PREFORM - Preforming denotes the first shaping. Preform is an unfinished, unused form of the proposed artifact. It is larger than and without the refinement of the completed tool.

"PUNCH AND BOSS" - To indent or perforate and stud a ceramic item.

PUNCTATE - Covered or dotted with minute depressions.

RIPARIAN - Growing naturally in the sides or banks of watercourses, ponds, etc.

RIVER TERRACE - Relict flood plains, abandoned during subsequent degradation by the formative stream.

ROUBIDOUX CHERT - The poor quality light grey and white banded chert is very sandy, drusy, vuggy and oolitic. The oolites are large 0.6-0.8 mm, sand-centerd, well defined and sometimes have a radial pattern developed. Quartzose inclusions are a common trait as well.

SAND - As a soil separate, individual rock or mineral fragments from 0.05 mm to 2.0 mm in diameter. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

SANGAMON - An interglacial stage in the pleistocene geologic stage in the Pleistocene geologic epoch, possibly dating between 375,000 and 120,000 years B.P.

SIDE SCRAPER - Implement with beveling on one or more margins of a flake or blade to obtain a strong cutting edge.

SILT - As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 mm) to the lower limit of very fine sand (0.05 mm). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

SOIL MOTTLING - Irregular spots of different colors that vary in number and size. Mottling generally indicates poor aeration and impeded drainage.

SPODIC HORIZON - A subsurface diagnostic horizon containing an illuvial accumulation of free sesquioxides of iron and aluminum and of organic matter.

SPORE - The reproductive body in cryptograms, analogous to the seeds of flowering plants but capable of developing asexually into an independant organism or individual.

TERRACE - Old alluvium deposited by stream action, which was bottomland (young alluvium) before stream entrenchment.

UNIFACE - Artifact bearing flake scars on one face.

UPLANDS - Physiographic positions where the soils are developed from the underlying rock, and which has not been transported in the present geologic cycle.

WATTLE AND DAUB - A frame or structure of rods or twigs woven together and coated with mud.

WELL-DRAINED SOIL - Water is removed from the soil so readily that the upper 40 inches generally does not have the mottles or dull colors related to wetness.

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APPENDIX A

REPORT OF RADIOCARBON DATING ANALYSES

REPORT OF RADIOCARBON DATING ANALYSES

FOR: William B. Lees
Soil Systems, Inc.

DATE RECEIVED: March 18, 1982
DATE REPORTED: March 24, 1982
BILLED TO SUBMITTER'S INVOICE NUMBER

OUR LAB NUMBER	YOUR SAMPLE NUMBER	C-14 AGE YEARS B.P. ± 1σ
Beta-4257	23BE1010, trench H feature #1	2940 ± 90 B.P.
Beta-4258	23BE1010, trench AA feature #2	1480 ± 70 B.P.

In agreement with international conventions, radiocarbon dates are calculated using the Libby half-life of 5568 years and 95% of the activity of the NBS Oxalic Acid as the modern standard. The quoted errors are one standard deviation based on the random nature of the radioactive disintegration process. B.P. stands for years before 1950 A.D.

APPENDIX B

ARTIFACT TABLES

Table 18. 23BE1010 Lithic Distribution

Test Unit 1 - SW¼, Level 1

Use Class	Lithic Type									
	Sandstone	Other	Mk	Mo	P	Ojc	Og	Or	Heat Treated Indeterminate	TOTAL
Projectile Point			1							1
Angular Fragments & Shatter				1						1
*Roughrock, Pebbles, Gravel, Cobbles		1								1
Non-Utilized Interior Flake						1				1
Utilized Flake Scraper						1				1
TOTAL	0	1	1	1	0	2	0	0	0	5

*Material present, but not used in calculating activity index.

Chert type code:
Mk - Chouteau chert
Mo - Burlington chert
P - Pierson chert
Ojc - Jefferson City chert
Og - Gasconade chert
Or - Roubidoux chert

Table 19. 23BE1010 Lithic Distribution

Test Unit 1 - SW¼, Level 2 (80-90 cm)

Use Class	Lithic Type									
	Sandstone	Other	Mk	Mo	P	Ojc	Og	Or	Heat Treated Indeterminate	TOTAL
Exhausted Core				1						1
Thermally Fractured Rock									3	3
Angular Fragments & Shatter				2		3				5
*Rough Rock, Pebbles	5	2								7
Utilized Flake Scraper			2		1					3
Non-Utilized Primary Decortification Flake			1			1				2
Non-Utilized Interior Flake			1	3						4
Non-Utilized Flake			1	4	2	2				9
TOTAL	5	2	5	10	3	6	0	0	3	34

*Material present, but not used in calculating activity index.

Chert type code:
Mk - Chouteau chert
Mo - Burlington chert
P - Pierson chert
Ojc - Jefferson City chert
Og - Gasconade chert
Or - Roubidoux chert

Table 20. 23BE1010 Lithic Distribution

Test Unit 1 - SW¼, Level 3 (90-100 cm)

Use Class	Lithic Type									
	Sandstone	Other	Mk	Mo	P	Ojc	Og	Or	Heat Treated Indeterminate	TOTAL
Projectile Point			1							1
Angular Fragments & Shatter							2			2
*Rough Rock, Pebbles Gravel, Cobbles	1	2								3
Utilized Blade-Like Flake			1							1
Utilized Flake Scraper						1				1
Non-Utilized Interior Flake				3		3				6
Non-Utilized Secondary Decortification Flake			2			1				3
Non-Utilized Flake			2	1		8	2			13
TOTAL	1	2	6	4	0	13	4	0	0	30

*Material present, but not used in calculating activity index.

Chert type code: Mk - Chouteau chert; Mo - Burlington chert; P - Pierson chert; Og - Gasconade chert; Ojc - Jefferson City chert; Or - Roubidoux chert

Table 21. 23BE1010 Lithic Distribution

Test Unit 1 - SW¼, Level 4 (100-110 cm)

Use Class	Lithic Type									
	Sandstone	Other	Mk	Mo	P	Ojc	Og	Or	Heat Treated Indeterminate	TOTAL
Drill/Perforator			1							1
Hammerstone		1								1
Core							1			1
Exhausted Core							1			1
Angular Fragments & Shatter			1	1						2
Thermally Altered Rock									1	1
Utilized Flake Scraper						1				1
Utilized Flake			1			1				2
Non-Utilized Primary Decortification Flake			4				1		1	6
Non-Utilized Interior Flake			1	8	1	3				13
Non-Utilized Blade-Like Flake				1						1
Non-Utilized Flake				20	1	13	4			38
TOTAL	0	1	8	30	2	18	7	0	2	68

Chert type code:

Mk - Chouteau chert
Mo - Burlington chert
P - Pierson chert
Ojc - Jefferson City chert
Og - Gasconade chert
Or - Roubidoux chert

Table 22. 23BE1010 Lithic Distribution

Test Unit 1 - SW¼, Level 5 (110-120 cm)

Use Class	Lithic Type									
	Sandstone	Other	Mk	Mo	P	Ojc	Og	Or	Heat Treated Indeterminate	TOTAL
Exhausted Core					1					1
Utilized Core					1					1
Angular Fragments & Shatter			2	1						3
Utilized Blade-Like Flake						1				1
Utilized Flake			2		2	2				6
Non-Utilized Primary Decortification Flake			2						1	3
Non-Utilized Interior Flake			3	3						6
Non-Utilized Flake			4	4	1	2				11
TOTAL	0	0	13	8	5	5	0	0	1	32

Chert type code:

Mk - Chouteau chert
Mo - Burlington chert
P - Pierson chert
Ojc - Jefferson City chert
Og - Gasconade chert
Or - Roubidoux chert

Table 23. 23BE1010 Lithic Distribution

Test Unit 1 - SW¼, Level 6 (120-130 cm)

Use Class	Lithic Type									
	Sandstone	Other	Mk	Mo	P	Ojc	Og	Or	Heat Treated Indeterminate	TOTAL
Angular Fragments & Shatter						1		2		3
Utilized Core			1							1
*Rough Rock		1								1
Utilized Flake						1				1
Non-Utilized Flake				4						4
Non-Utilized Interior Flake				1						1
TOTAL	0	1	1	5	0	2	0	2	0	11

*Material present, but not used in calculating activity index.

Chert type code: Mk - Chouteau chert
Mo - Burlington chert
P - Pierson chert
Ojc - Jefferson City chert
Og - Gasconade chert
Or - Roubidoux chert

Table 24. 23BE1010 Lithic Distribution

Test Unit 1 - SW¼, Level 7 (130-140 cm)

Use Class	Lithic Type									
	Sandstone	Other	Mk	Mo	P	Ojc	Og	Or	Heat Treated Indeterminate	TOTAL
Exhausted Core						1				1
TOTAL	0	0	0	0	0	1	0	0	0	1

Chert type code:

Mk - Chouteau chert
Mo - Burlington chert
P - Pierson chert
Ojc - Jefferson City chert
Og - Gasconade chert
Or - Roubidoux chert

Table 25. 23BE1010 Lithic Distribution

Test Unit 1 - SW¼, Level 8 (140-150 cm)

Use Class	Lithic Type									
	Sandstone	Other	Mk	Mo	P	Ojc	Og	Or	Heat Treated Indeterminate	TOTAL
Angular Fragments & Shatter		2	1					7		10
Non-Utilized Primary Decortification Flake				1						1
Non-Utilized Interior Flake				2						2
TOTAL	0	2	1	3	0	0	0	7	0	13

Chert type code:

Mk - Chouteau chert
Mo - Burlington chert
P - Pierson chert
Ojc - Jefferson City chert
Og - Gasconade chert
Or - Roubidoux chert

Table 26. 23BE1010 Lithic Distribution

Test Unit 1 - SW¼, Level 9 (150-160 cm)

Use Class	Lithic Type									
	Sandstone	Other	Mk	Mo	P	Ojc	Og	Or	Heat Treated Indeterminate	TOTAL
Core			1							1
Thermally Altered Rock		2								2
TOTAL	0	2	1	0	0	0	0	0	0	3

Chert type code:

Mk - Chouteau chert
Mo - Burlington chert
P - Pierson chert
Ojc - Jefferson City chert
Og - Gasconade chert
Or - Roubidoux chert

Table 27. 23BE1010 Lithic Distribution

Test Unit 1 - SW¼, Level 10 (170-180 cm)

Use Class	Lithic Type									
	Sandstone	Other	Mk	Mo	P	Ojc	Og	Or	Heat Treated Indeterminate	TOTAL
*Rough Rock		1								1
TOTAL	0	1	0	0	0	0	0	0	0	1

*Material present, but not used in calculating activity index.

Test Unit 1 - SW¼, Level 11 (180-190 cm)

Use Class	Lithic Type									
	Sandstone	Other	Mk	Mo	P	Ojc	Og	Or	Heat Treated Indeterminate	TOTAL
Exhausted Core						3				3
TOTAL	0	0	0	0	0	3	0	0	0	3

Chert type code:

Mk - Chouteau chert
Mo - Burlington chert
P - Pierson chert
Ojc - Jefferson City chert
Og - Gasconade chert
Or - Roubidoux chert

Table 28. 23BE1010 Artifact Provenience

		TRENCH A	TRENCH B	TRENCH C	TRENCH D	TRENCH E	TRENCH F	TRENCH G	TRENCH H Feature 1	TRENCH
Projectile Point		1	1							
Unifacial Scraper		1	1							
Bifacial Scraper			2	1						
Utilized Flake Scraper		1	2		1					
Spokeshave Flake Scraper						1				
Drill/Perforator										
Groundstone Tool		1								
Hammerstone					1					
Chopper		2								
Abrader		1								
Bifacial Tool Fragment		1	1						2	
Core		1							2	
Exhausted Core & Core Fragments			1							
Utilized Core		1								
Thermally Fractured Rock		2								
Angular Fragments & Shatter		7			1	4	2		97	
Rough Rock, Pebbles, Gravel & Cobbles					1	2	2		1	
Non-Utilized Primary Decortification Flake			1				1			
Non-Utilized Secondary Decortification Flake		2	1			1				
Non-Utilized Interior Flake		8	5			1				
Blade-Like Flake	Utilized	2	2							
	Non-Utilized		2				1			
Flake	Utilized	1								
	Non-Utilized	15	17	1		3			21	
Ceramics		3	1	6				2		
Daub										
TOTAL		50	37	8	4	12	6	2	123	0

Table 28. 23BE1010 Artifact Provenience Cont'd.

	TRENCH J	TRENCH AA Feature 2	TRENCH BB	TRENCH AAA	TRENCH BBB	TEXT UNIT 1 NE¼ Level 1	TEST UNIT 1 NW¼ Level 1
Projectile Point				1			
Unifacial Scraper				2			
Bifacial Scraper	1	1					
Utilized Flake Scraper				1			
Spokeshave Flake Scraper							
Drill/Perferator							
Groundstone Tool						1	
Hammerstone							
Chopper							
Abrader							
Bifacial Tool Fragment				2			
Core	1					1	
Exhausted Core & Core Fragments						3	
Utilized Core				1			
Thermally Fractured Rock							
Angular Fragments & Shatter		1		5		3	
Rough Rock, Pebbles, Gravel & Cobbles						5	
Non-Utilized Primary Decortification Flake							
Non-Utilized Secondary Decortification Flake							
Non-Utilized Interior Flake						3	
Blade-Like Flake — Utilized							
Blade-Like Flake — Non-Utilized							
Flake — Utilized							
Flake — Non-Utilized							
Ceramics							
Daub		26					
TOTAL	2	28	0	12	0	16	0

Table 28. 23BE1010 Artifact Provenience Cont'd.

	TEST UNIT 1 SE¼ Level 1	TEST UNIT 1 SW¼ Level 1	TEST UNIT 1 SW¼ Level 2	TEST UNIT 1 SW¼ Level 3	TEST UNIT 1 SW¼ Level 4	TEST UNIT 1 SW¼ Level 5
Projectile Point		1		1		
Unifacial Scraper						
Bifacial Scraper						
Utilized Flake Scraper		1	3	1	1	
Spokeshave Flake Scraper						
Drill/Perforator					1	
Groundstone Tool						
Hammerstone					1	
Chopper						
Abrader						
Bifacial Tool Fragment						
Core					1	
Exhausted Core & Core Fragments			1		1	1
Utilized Core						1
Thermally Fractured Rock			3		1	
Angular Fragments & Shatter		1	5	2	2	3
Rough Rock, Pebbles, Gravel & Cobbles	1	1	7	3	1	
Non-Utilized Primary Decortification Flake			2		6	3
Non-Utilized Secondary Decortification Flake				3		
Non-Utilized Interior Flake	3	1	4	6	13	6
Blade-Like Flake — Utilized				1		1
Blade-Like Flake — Non-Utilized	1				1	
Flake — Utilized					2	6
Flake — Non-Utilized			9	13	38	11
Ceramics	1					
Daub						
TOTAL	6	5	34	30	69	32

Table 28. 23BE1010 Artifact Provenience Cont'd.

		TEST UNIT 1 SW¼ Level 6	TEST UNIT 1 SW¼ Level 7	TEST UNIT 1 SW¼ Level 8	TEST UNIT 1 SW¼ Level 9	TEST UNIT 1 SW¼Level 10	TEST UNIT 1 SW¼Level 11	TOTAL
Projectile Point								5
Unifacial Scraper								4
Bifacial Scraper								5
Utilized Flake Scraper								11
Spokeshave Flake Scraper								1
Drill/Perferator								1
Groundstone Tool								2
Hammerstone								2
Chopper								2
Abrader								1
Bifacial Tool Fragment								6
Core					1			7
Exhausted Core & Core Fragments			1				3	11
Utilized Core		1						4
Thermally Fractured Rock					2			8
Angular Fragments & Shatter		3		10				146
Rough Rock, Pebbles, Gravel & Cobbles		1				1		26
Non-Utilized Primary Decortification Flake				1				14
Non-Utilized Secondary Decortification Flake								7
Non-Utilized Interior Flake		1		2				53
Blade-Like Flake	Utilized							6
	Non-Utilized							5
Flake	Utilized	1						10
	Non-Utilized	4						132
Ceramics								13
Daub								26
TOTAL		11	1	13	3	1	3	508

Table 29. Lithic Artifacts from National Register Testing at 23BE1010, 1982*

USE CLASS	LITHIC TYPE								
	OTHER (SANDSTONE)	CHOUTEAU	BURLINGTON	PIERSON	JEFFERSON CITY	GASCONADE	ROUBIDOUX	HEAT TREATED INDETERMINATE	TOTAL
Projectile Point		8	2	1	1				12
Rough Rock, Pebbles, Gravel	23								23
Abrader	1								1
Hoe/Chopper		1		1					2
Utilized Flake Scraper		2	3	2	8				15
Unifacial Scraper		4	2	1	3				10
Bifacial Scraper		6	1	1	1				9
Drill/Perferator		1							1
Groundstone Tool	4								4
Hammerstone	1								1
Mano	1								1
Nutting Stone	1								1
Ground Cobble	2								2
Bifacial Tool Fragment		2		3	1	2			8
Core		4	3		1	1		1	10
Exhausted Core		8	3	2	6	1			20
Core Tool		2	1	1	1	1			6
Utilized			1						1
Primary Decortification Flake									
Non-Utilized		7	2	3		1		3	16
Utilized		1							1
Secondary Decortification Flake									
Non-Utilized		3	3	2	3			1	12

Table 29. Lithic Artifacts from National Register Testing at 23BE1010, 1982* Cont'd.

USE CLASS	LITHIC TYPE								
	OTHER (SANDSTONE)	CHOUTEAU	BURLINGTON	PIERSON	JEFFERSON CITY	GASCONADE	ROUBIDOUX	HEAT TREATED INDETERMINATE	TOTAL
Interior Flake									
Utilized		2	1	1	6				10
Non-Utilized		6	17	1	14			1	39
Flake									
Utilized		4	2	1	15		18		40
Non-Utilized		25	64	5	22	6			122
Blade-Like Flake									
Utilized		2	1		3				6
Non-Utilized		2	2	1					5
Angular Fragments & Shatter									
Utilized			2						2
Non-Utilized		9	26	2	7	19	89		152
Thermally Fractured Rock	3							7	10
Spokeshave Flake			2		1				3
TOTAL	36	99	138	28	93	31	107	13	545

*In addition to these 545 lithic artifacts, 13 ceramic sherds and 26 pieces of daub were recovered.

APPENDIX C

23BE1010 ARTIFACT ILLUSTRATIONS

Figure 22. 23BE1010 Projectile Point Description.

A. Snyder Point.

B. Preform for a Snyder type Point.

C. Indeterminate point fragment.

D. Snyder Point.

E. Small Corner Notched Point.

F. Indeterminate point tip fragment.

G. Indeterminate point shoulder fragment.

H. Indeterminate point fragment.

I. Similar to the Rice Side-Notched Point type.

J. Resembles the Rice Side-Notched Point type.

K. Similar to the Scallorn Point type.

L. Resembles Marcos Point.

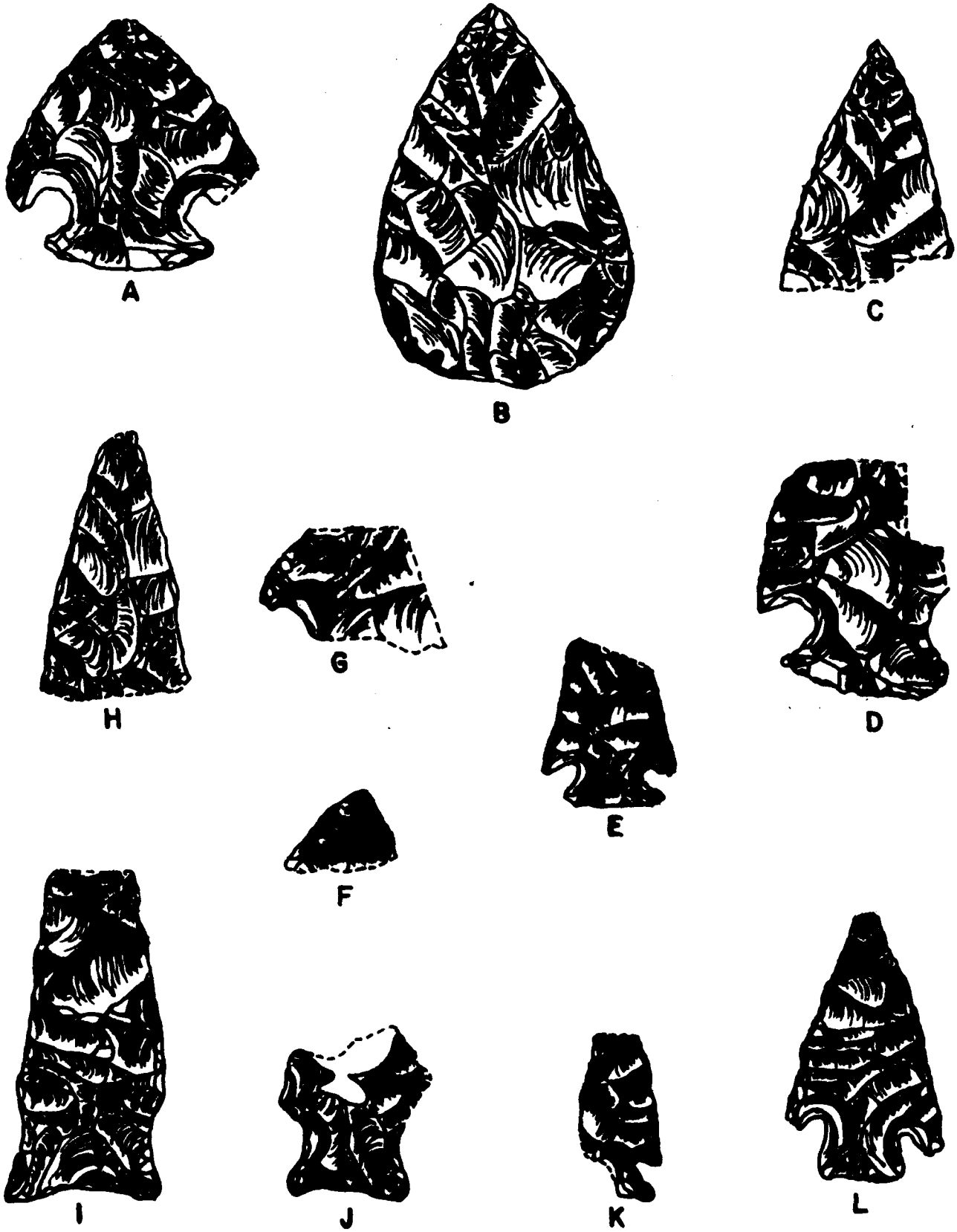

Figure 22. 23BE1010 Projectile Points.

Figure 23. 23BE1010 Artifact description.

A. Scraper

B. Flake blade

C. Hafted chopper

D-F. Scrapers

G. Bifacial scraper or digging tool

H-I. Flake blades

J. Scraper

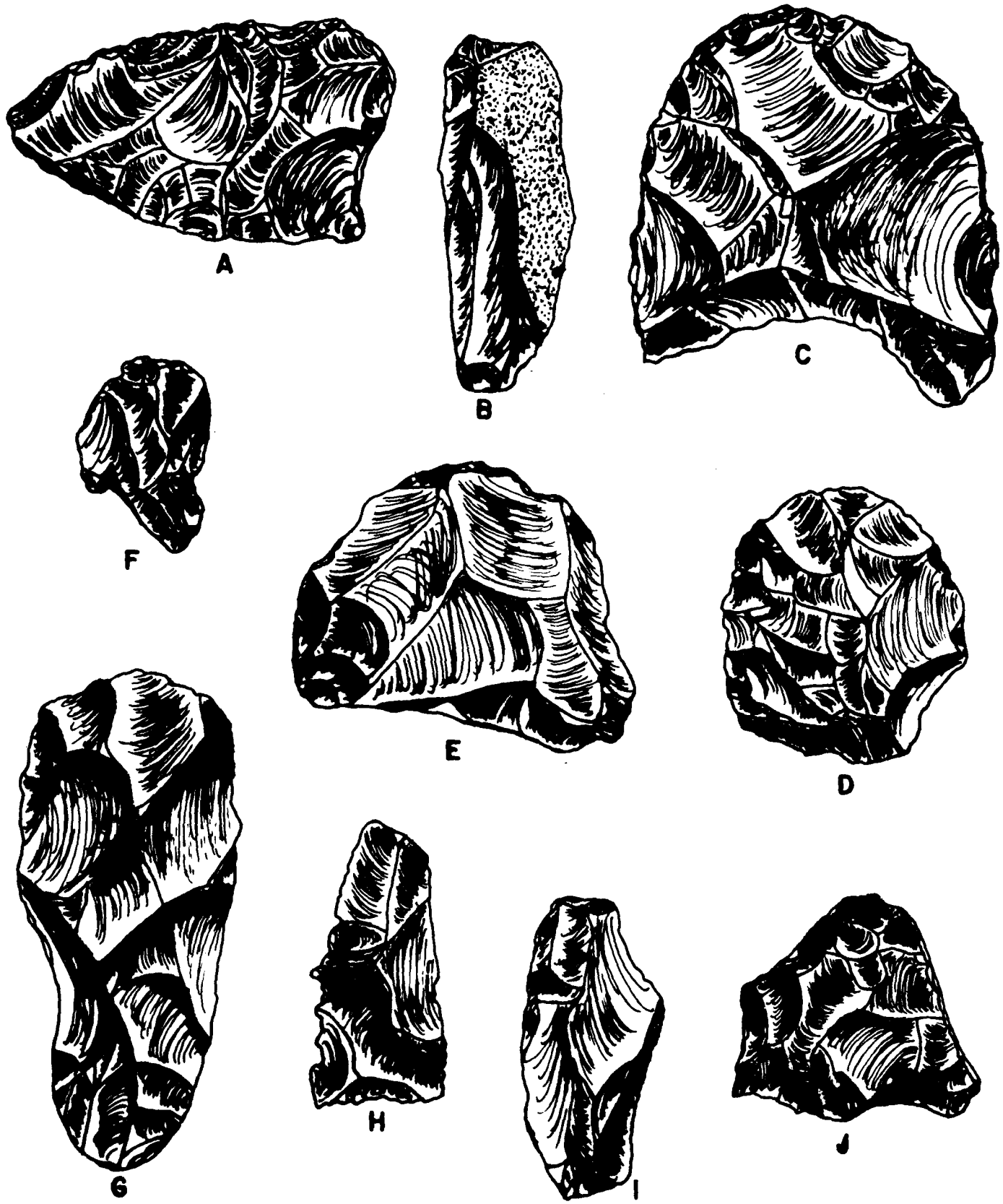

Figure 23. 23BE1010 Artifacts.

Figure 24. 23BE1010 Artifact description.

A. Chopping tool

B. Flake scraper

C. Bifacial scraper or digging tool

D. Scraper

E. Flake blade

F. Flake spokeshave

G-J. Scrapers

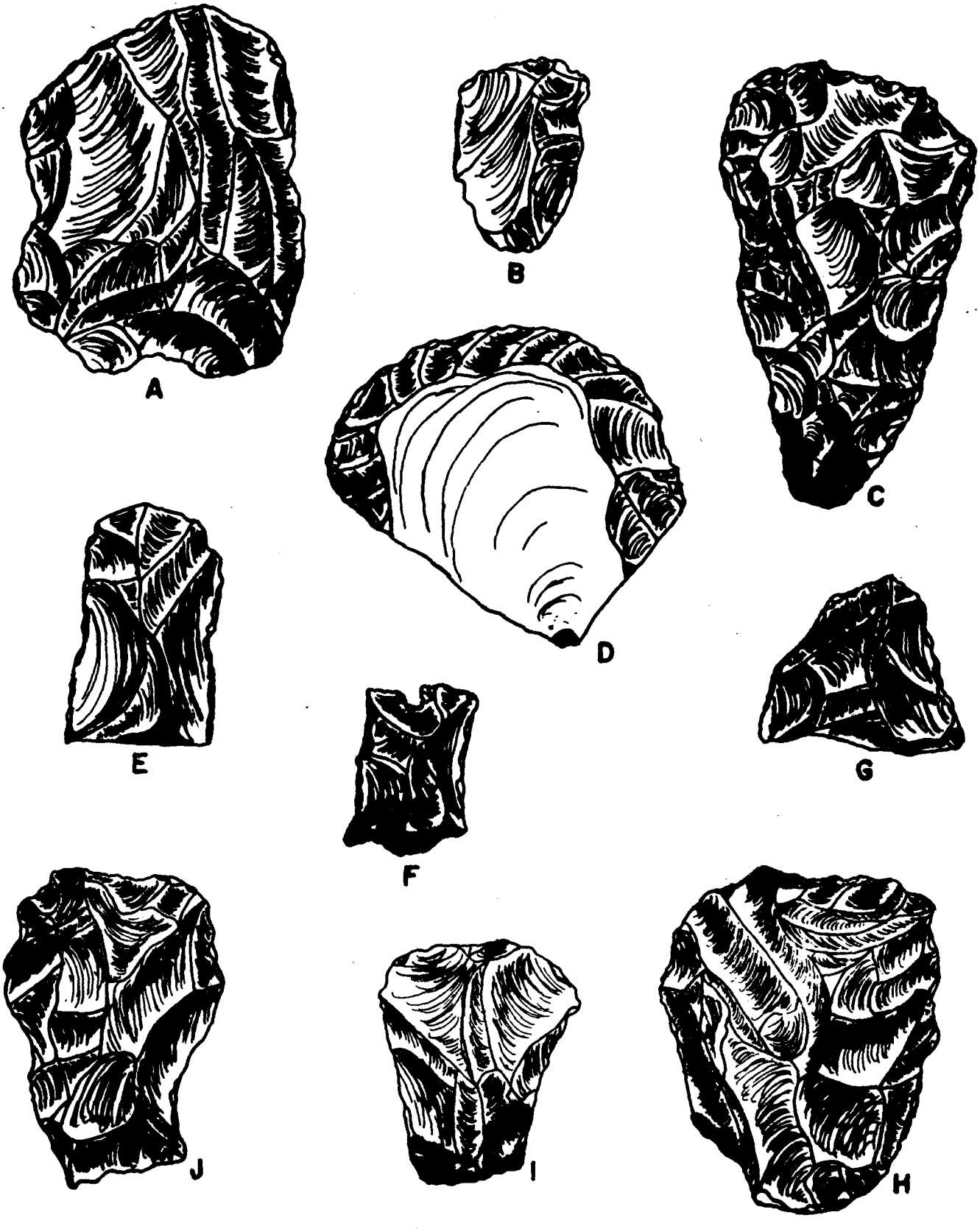

Figure 24. 23BE1010 artifacts